Curriculum Vitae

Personal Data

Title	Prof. Dr.-Ing. Habil. Dr. h.c.
First name	Dierk
Name	Raabe
Current position	Managing Director Max-Planck-Institut Professor (RWTH Aachen (Germany), KU Leuven (Belgium))
Current institution(s)/site(s), country	Max Planck Institut für Nachhaltige Materialien GmbH, Düsseldorf, Deutschland
Identifiers/ORCID	https://orcid.org/0000-0003-0194-6124

Qualifications and Career

Stages	**Periods and Details**
Diploma	Physical Metallurgy and Metal Physics, RWTH Aachen, Diplom, summa cum laude, 1984-1990
Doctorate	Physical Metallurgy and Metal Physics, RWTH Aachen, Dr.-Ing., summa cum laude, 1990-1992
Habilitation	Physical Metallurgy and Metal Physics, RWTH Aachen, Habilitation, 1992-1997
Stages of academic/professional career	Since 1999 Director, Max-Planck-Institut für Eisenforschung (now MPI for Sustainable Materials), Düsseldorf, Germany 1997 – today Professor (APL), Physical Metallurgy and Metal Physics, RWTH Aachen, Germany Postdoctoral researcher, Dept. Materials Science & Engineering, Carnegie Mellon University, USA 1992 – 1997 Research assistant, group leader, Institute for Physical Metallurgy and Metal Physics, RWTH Aachen, Germany

Engagement in the Research System

During my scientific career, I have been engaged in various organizations and committees, which I summarized in the table below.

	Member and senator of German National Science Academy Leopoldina
	Member US National Academy of Engineering
	Member North-Rhine-Westfaelian Academy of Sciences
	Member German Academy of Technical Sciences

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Posco Co. LTD. v. ArcelorMittal
IPR2025-00370
Page 1 of 87

2019	Chair of the Gordon Research Conference on Physical Metallurgy, USA
2017-2023	Senator of Helmholtz Association of German Research Centres (HGF)
2013 + 2019	Member, Expert Committee for the German 'Excellence Initiative and Excellence Strategy'
2012-2017	Chairman of the Board of Governors (Hochschulrat) of RWTH Aachen University, Aachen, Germany
2010-2016	Member, Council of Science and Humanities of the German Government (Wissenschaftsrat)
2007-2019	Vice Chair of SFB 761 'Steel ab initio'

Supervision of Researchers in Early Career Phases
Supervised >50 postdocs (incl. >35 Alexander-von-Humboldt fellows), >35 PhD students, all at PI's host institution Max-Planck Institut Düsseldorf (Ph.D. exams at RWTH Aachen, Germany, and at Ruhr University Bochum, Germany); >25 co-workers gained Professorship positions during the past 10 years (Assistant, Associated, Full) in the US, Europe, Asia (including MIT, RWTH Aachen, KU Leuven, Korea University, Xian University, Tohoku Univ. etc.)

Awards (selected)

2004	Gottfried Wilhelm Leibniz Award, DFG (Highest German Science Award)
2012 & 2022	2 ERC Advanced Grants, ERC (Highest European Single Person Research Grant)
2022	Acta Materialia Gold Medal
2022	Doctor Honoris Causa Norwegian Technicl University Trondheim
	6 Best - Paper Awards (Best paper award of the Journal International Journal of Materials Research for the paper: A novel roll-bonding methodology for the cross-scale analysis of phase properties and interactions in multiphase structural materials. International Journal of Materials Research 106 (2015) 3-14; ^ Best Paper Award for the paper "Autonomous Filling of Grain-Boundry Cavaties during Creep Loading in Fe-Mo Alloys." in Metallurgical and Materials Transactions; best paper in steel research "Investigation of the orientation dependence of recovery in low-carbon steel by use of single orientation determination" steel research 66 (1995) No.5, p. 222/29) Best paper award for the paper "Sustainable iron making towards a future circular steel economy: exploiting a critical oxygen concentration for metallurgical Cu removal from scrap-based melts" in Steel Research International - 2024 Edition Hauke Springer, Isnaldi Souza, Alisson da Silva, Ömer Büyükuslu, Dierk Raabe

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 2 of 87

	Best paper award for the paper "On the optical spectra of hydrogen plasma smelting reduction of iron ore: application and requirements" in Steel Research International - 2024 Edition 2024 Outstanding Paper Award for the article "Hydrogen-based direct reduction of iron oxide at 700°C: Heterogeneity at pellet and microstructure scales" by the International Journal of Minerals, Metallurgy, and Materials, 2022, Vol. 29, Pages 1901-1907, by Yan MA, Isnaldi Souza Filho, Xue Zhang, Supriya Nandy, Pere Barriobero-Vila, Guillermo Requena, Vogel Dirk, Michael Rohwerder, Dirk Ponge, Hauke Springer, and Dierk Raabe.
2021	Kelly Lecture, 100th anniversary year lecture of the Department of Materials Science & Metallurgy, University of Cambridge
2019	Bauerman Lecture Award Imperial College, London
2018	Seidman Lecture Award Tel Aviv University
2019	TMS Light Metals Award (Aluminium Alloys)
2014	Honorary Professor, Katholieke Universiteit Leuven, Belgium
2011	DGM Award Award of the German Society for Materials Science
2011	Weinberg Lecture Award University of British Columbia
2008	Lee Hsun Lecture Award the Chinese Academy of Sciences
2001	Materials Science and Technology Award the Federation of European Materials Science Societies FEMS
1997	Masing Award German Society for Materials Science DGM
1997	Heisenberg Scholarship German Research Foundation DFG

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 3 of 87

Publications, May 2025

Prof. Dr.-Ing. habil. Dr. h.c. Dierk Raabe,

Managing Director, Max Planck Institute for Sustainable Materials

Senator, National Academy Leopoldina

Member US National Academy of Engineering

dierk.raabe@gmail.com

1. Abdellaoui, L., Chen, Z., Yu, Y., Luo, T., Hanus, R., Schwarz, T., Bueno Villoro, R., Cojocaru-Mirédin, O., Snyder, G. J., & Raabe, D. (2021). Parallel Dislocation Networks and Cottrell Atmospheres Reduce Thermal Conductivity of PbTe Thermoelectrics. *Advanced Functional Materials*, *31*(20), 2101214.
2. Abdellaoui, L., Zhang, S., Zaefferer, S., Bueno-Villoro, R., Baranovskiy, A., Cojocaru-Mirédin, O., Yu, Y., Amouyal, Y., Raabe, D., Snyder, G. J., & Scheu, C. (2019). Density, distribution and nature of planar faults in silver antimony telluride for thermoelectric applications. *Acta Materialia*, *178*, 135–145. https://doi.org/10.1016/j.actamat.2019.07.031
3. Aboulfadl, H., Deges, J., Choi, P., & Raabe, D. (2015). Dynamic strain aging studied at the atomic scale. *Acta Materialia*, *86*, 34–42. https://doi.org/10.1016/j.actamat.2014.12.028
4. Alankar, A., Eisenlohr, P., & Raabe, D. (2011). A dislocation density-based crystal plasticity constitutive model for prismatic slip in α-titanium. *Acta Materialia*, *59*(18), 7003–7009. https://doi.org/10.1016/j.actamat.2011.07.053
5. Alankar, A., Field, D. P., & Raabe, D. (2014). Plastic anisotropy of electro-deposited pure α-iron with sharp crystallographic <1 1 1>// texture in normal direction: Analysis by an explicitly dislocation-based crystal plasticity model. *International Journal of Plasticity*, *52*, 18–32. https://doi.org/10.1016/j.ijplas.2013.03.006
6. Al-Sawalmih, A., Li, C., Siegel, S., Fabritius, H., Yi, S., Raabe, D., Fratzl, P., Paris, O., Al-Sawalmih, A., Li, C., Siegel, S., Fabritius, H., Yi, S., Raabe, D., Fratzl, P., & Paris, O. (2008). Microtexture and chitin/calcite orientation relationship in the mineralized exoskeleton of the American lobster. *Advanced Functional Materials*, *18*(20), 3307–3314. https://doi.org/10.1002/adfm.200800520

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 4 of 87

7. Alves, P. H. O. M., Lima, M. S. F. F., Raabe, D., & Sandim, H. R. Z. R. Z. (2018). Laser beam welding of dual-phase DP1000 steel. *Journal of Materials Processing Technology*, *252*(April 2017), 498–510. https://doi.org/10.1016/j.jmatprotec.2017.10.008

8. Antonov, S., Shi, R., Li, D., Kloenne, Z., Zheng, Y., Fraser, H. L., Raabe, D., & Gault, B. (2021). Nucleation and growth of α phase in a metastable β-Titanium Ti-5Al-5Mo-5V-3Cr alloy: Influence from the nano-scale, ordered-orthorhombic O "phase and α compositional evolution. *Scripta Materialia*, *194*, 113672.

9. Aparicio-Fernández, R., Springer, H., Szczepaniak, A., Zhang, H., & Raabe, D. (2016). In-situ metal matrix composite steels: Effect of alloying and annealing on morphology, structure and mechanical properties of TiB2 particle containing high modulus steels. *Acta Materialia*, *107*, 38–48. https://doi.org/10.1016/j.actamat.2016.01.048

10. Aparicio-Fernández, R., Szczepaniak, A., Springer, H., & Raabe, D. (2017). Crystallisation of amorphous Fe – Ti – B alloys as a design pathway for nano-structured high modulus steels. *Journal of Alloys and Compounds*, *704*, 565–573. https://doi.org/10.1016/j.jallcom.2017.02.077

11. ART COUNTS, W., FRIAK, M., RAABE, D., & NEUGEBAUER, J. (2010). Ab Initio Guided Design of bcc Ternary Mg-Li-X (X. *Advanced Engineering Materials*, *12*(7), 572–576.

12. Ayodele, S. G., Raabe, D., & Varnik, F. (2013). Lattice boltzmann modeling of advection-diffusion-reaction equations: Pattern formation under uniform differential advection. *Communications in Computational Physics*, *13*(3), 741–756. https://doi.org/10.4208/cicp.441011.270112s

13. Ayodele, S. G., Raabe, D., & Varnik, F. (2015). Shear-flow-controlled mode selection in a nonlinear autocatalytic medium. *Physical Review E*, *91*(2), 22913. https://doi.org/10.1103/PhysRevE.91.022913

14. Ayodele, S. G., Varnik, F., & Raabe, D. (2009). Effect of aspect ratio on transverse diffusive broadening: A lattice Boltzmann study. *Physical Review E*, *80*(1), 16304. https://doi.org/10.1103/PhysRevE.80.016304

15. Ayodele, S. G., Varnik, F., & Raabe, D. (2011). Lattice Boltzmann study of pattern formation in reaction-diffusion systems. *Physical Review E*, *83*(1), 16702. https://doi.org/10.1103/PhysRevE.83.016702

16. Bai, Y., Mianroodi, J., Ma, Y., da Silva, A. K., Svendsen, B., & Raabe, D. (2021). Chemo-Mechanical Phase-Field Modeling of Iron Oxide Reduction with Hydrogen. *Acta Materialia*, *231*(6), 117899. https://doi.org/10.1016/j.actamat.2022.117899

17. Bajaj, P., Hariharan, A., Kini, A., Kürnsteiner, P., Raabe, D., & Jägle, E. A. E. A. A. (2020). Steels in additive manufacturing: A review of their microstructure and properties. *Materials Science and Engineering A*, *772*(November 2019), 138633. https://doi.org/10.1016/j.msea.2019.138633

18. Balachandran, S., Orava, J., Köhler, M., Breen, A. J., Kaban, I., Raabe, D., & Herbig, M. (2019). Elemental re-distribution inside shear bands revealed by correlative

atom-probe tomography and electron microscopy in a deformed metallic glass. *Scripta Materialia*, *168*, 14–18. https://doi.org/10.1016/j.scriptamat.2019.04.014

19. Balachandran, S., Zachariah, Z., Fischer, A., Mayweg, D., Wimmer, M. A., Raabe, D., & Herbig, M. (2020). Atomic Scale Origin of Metal Ion Release from Hip Implant Taper Junctions. *Advanced Science*, *7*(5), 1–10. https://doi.org/10.1002/advs.201903008

20. Barani, A. A., Li, F., Romano, P., Ponge, D., & Raabe, D. (2007). Design of high-strength steels by microalloying and thermomechanical treatment. *Materials Science and Engineering A*, *463*(1–2), 138–146. https://doi.org/10.1016/j.msea.2006.08.124

21. Barani, A. A., Ponge, D., & Raabe, D. (2006). Strong and Ductile Martensitic Steels for Automotive Applications. *Steel Research International*, *77*(9–10), 704–711. https://doi.org/10.1002/srin.200606451

22. Barani, A. A., Ponge, D., Raabe, D., Ardehali Barani, A., Ponge, D., & Raabe, D. (2006). Refinement of grain boundary carbides in a Si–Cr spring steel by thermomechanical treatment. *Materials Science and Engineering: A*, *426*(1–2), 194–201. https://doi.org/10.1016/j.msea.2006.04.002

23. Baron, C., Springer, H., & Raabe, D. (2016a). Combinatorial screening of the microstructure–property relationships for Fe–B–X stiff, light, strong and ductile steels. *Materials and Design*, *112*, 131–139. https://doi.org/10.1016/j.matdes.2016.09.065

24. Baron, C., Springer, H., & Raabe, D. (2016b). Effects of Mn additions on microstructure and properties of Fe–TiB2 based high modulus steels. *Materials & Design*, *111*, 185–191. https://doi.org/10.1016/j.matdes.2016.09.003

25. Baron, C., Springer, H., & Raabe, D. (2016c). Efficient liquid metallurgy synthesis of Fe-TiB2 high modulus steels via in-situ reduction of titanium oxides. *Materials and Design*, *97*, 357–363. https://doi.org/10.1016/j.matdes.2016.02.076

26. Baron, C., Springer, H., & Raabe, D. (2018a). Development of high modulus steels based on the Fe – Cr – B system. *Materials Science and Engineering A*, *724*(February), 142–147. https://doi.org/10.1016/j.msea.2018.03.082

27. Baron, C., Springer, H., & Raabe, D. (2018b). Development of high modulus steels based on the Fe–Cr–B system. *Materials Science and Engineering: A*, *724*, 142–147.

28. Bartels, C., Raabe, D., Gottstein, G., & Huber, U. (1997). Investigation of the precipitation kinetics in an A16061/TiB2 metal matrix composite. *Materials Science and Engineering: A*, *237*(1), 12–23. https://doi.org/10.1016/S0921-5093(97)00104-4

29. Bastos, A., Zaefferer, S., & Raabe, D. (2008a). Three-dimensional EBSD study on the relationship between triple junctions and columnar grains in electrodeposited Co–Ni films. *Journal of Microscopy*, *230*(3), 487–498.

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 6 of 87

30. Bastos, A., Zaefferer, S., & Raabe, D. (2008b). Three-dimensional EBSD study on the relationship between triple junctions and columnar grains in electrodeposited Co-Ni films. *Journal of Microscopy*, *230*(3), 487–498. https://doi.org/10.1111/j.1365-2818.2008.02008.x

31. Bastos, A., Zaefferer, S., & Raabe, D. (2009). Orientation Microscopy on Nanostructured Electrodeposited NiCo-Films. *Advanced Materials Research*, *15–17*, 953–958. https://doi.org/10.4028/www.scientific.net/amr.15-17.953

32. Bastos, A., Zaefferer, S., Raabe, D., & Schuh, C. (2006). Characterization of the microstructure and texture of nanostructured electrodeposited NiCo using electron backscatter diffraction (EBSD). *Acta Materialia*, *54*(9), 2451–2462. https://doi.org/10.1016/j.actamat.2006.01.033

33. Basu, S., Li, Z., Pradeep, K. G., & Raabe, D. (2018). Strain rate sensitivity of a TRIP-assisted dual-phase high-entropy alloy. *Frontiers in Materials*, *5*(May), 30. https://doi.org/10.3389/fmats.2018.00030

34. Bauer, S., Benner, P., Bereau, T., Blum, V., Boley, M., Carbogno, C., Catlow, R., Dehm, G., Eibl, S., Ernstorfer, R., Fekete, Á., Foppa, L., Fratzl, P., Freysoldt, C., Gault, B., Ghiringhelli, L. M., Giri, S. K., Gladyshev, A., Goyal, P., … Scheffler, M. (2024). Roadmap on Data-Centric Materials Science. *Modelling and Simulation in Materials Science and Engineering*, *32*(063301). https://doi.org/10.1088/1361-651x/ad4d0d

35. Belde, M., Springer, H., Inden, G., & Raabe, D. (2015). Multiphase microstructures via confined precipitation and dissolution of vessel phases: Example of austenite in martensitic steel. *Acta Materialia*, *86*, 1–14. https://doi.org/10.1016/j.actamat.2014.11.025

36. Belde, M., Springer, H., & Raabe, D. (2016). Vessel microstructure design: A new approach for site-specific core-shell micromechanical tailoring of TRIP-assisted ultra-high strength steels. *Acta Materialia*, *113*, 19–31. https://doi.org/10.1016/j.actamat.2016.04.051

37. Benzing, J. T., Bentley, J., McBride, J. R., Ponge, D., Han, J., Raabe, D., & Wittig, J. E. (2017). Characterization of Partitioning in a Medium-Mn Third-Generation AHSS. *Microscopy and Microanalysis*, *23*(S1), 402–403. https://doi.org/10.1017/s1431927617002690

38. Benzing, J. T., Kwiatkowski da Silva, A., Morsdorf, L., Bentley, J., Ponge, D., Dutta, A., Han, J., McBride, J. R., van Leer, B., Gault, B., Raabe, D., & Wittig, J. E. (2019). Multi-scale characterization of austenite reversion and martensite recovery in a cold-rolled medium-Mn steel. *Acta Materialia*, *166*, 512–530. https://doi.org/10.1016/j.actamat.2019.01.003

39. Benzing, J. T., Poling, W. A., Pierce, D. T., Bentley, J., Findley, K. O., Raabe, D., & Wittig, J. E. (2018). Effects of strain rate on mechanical properties and deformation behavior of an austenitic Fe-25Mn-3Al-3Si TWIP-TRIP steel. *Materials Science and Engineering A*, *711*(November 2017), 78–92. https://doi.org/10.1016/j.msea.2017.11.017

40. Benzing, J. T. T., Liu, Y., Zhang, X., Luecke, W. E. E., Ponge, D., Dutta, A., Oskay, C., Raabe, D., & Wittig, J. E. E. (2019). Experimental and numerical study of mechanical properties of multi-phase medium-Mn TWIP-TRIP steel: Influences of strain rate and phase constituents. *Acta Materialia*, *177*, 250–265. https://doi.org/10.1016/j.actamat.2019.07.036

41. Bieler, T. R., Eisenlohr, P., Roters, F., Kumar, D., Mason, D. E., Crimp, M. A., & Raabe, D. (2009). The role of heterogeneous deformation on damage nucleation at grain boundaries in single phase metals. *International Journal of Plasticity*, *25*(9), 1655–1683. https://doi.org/10.1016/j.ijplas.2008.09.002

42. Bong, H. J., Kirchlechner, C., Raabe, D., Choi, W. S., Pang, E. L., Ko, W.-S., Jun, H., Bong, H. J., Kirchlechner, C., Raabe, D., & Choi, P.-P. (2021). Orientation-dependent plastic deformation mechanisms and competition with stress-induced phase transformation in microscale NiTi. *Acta Materialia*, *208*, 116731. https://doi.org/10.1016/j.actamat.2021.116731

43. Boßelmann, F., Romano, P., Fabritius, H., Raabe, D., & Epple, M. (2007). The composition of the exoskeleton of two crustacea: The American lobster Homarus americanus and the edible crab Cancer pagurus. *Thermochimica Acta*, *463*(1–2), 65–68. https://doi.org/10.1016/j.tca.2007.07.018

44. Brahme, A., Winning, M., & Raabe, D. (2009). Prediction of cold rolling texture of steels using an Artificial Neural Network. *Computational Materials Science*, *46*(4), 800–804. https://doi.org/10.1016/j.commatsci.2009.04.014

45. Brands, D., Balzani, D., Scheunemann, L., Schröder, J., Richter, H., & Raabe, D. (2016). Computational modeling of dual-phase steels based on representative three-dimensional microstructures obtained from EBSD data. *Archive of Applied Mechanics*, *86*(3), 575–598. https://doi.org/10.1007/s00419-015-1044-1

46. Brands, D., Schröder, J., Balzani, D., Dmitrieva, O., & Raabe, D. (2011). On the Reconstruction and Computation of Dual-Phase Steel Microstructures Based on 3D EBSD Data. *PAMM*, *11*(1), 503–504. https://doi.org/10.1002/pamm.201110243

47. Breen, A. J., Mouton, I., Lu, W., Wang, S., Szczepaniak, A., Kontis, P., Stephenson, L. T. T., Chang, Y., da Silva, A. K., Liebscher, C. H., Raabe, D., Britton, T. B., Herbig, M., & Gault, B. (2018). Atomic scale analysis of grain boundary deuteride growth front in Zircaloy-4. *Scripta Materialia*, *156*, 42–46. https://doi.org/10.1016/j.scriptamat.2018.06.044

48. Breitbarth, E., Zaefferer, S., Archie, F., Besel, M., Raabe, D., & Requena, G. (2018). Evolution of dislocation patterns inside the plastic zone introduced by fatigue in an aged aluminium alloy AA2024-T3. *Materials Science and Engineering: A*, *718*(January), 345–349. https://doi.org/10.1016/j.msea.2018.01.068

49. Bu, Y., Li, Z., Liu, J., Wang, H., Raabe, D., & Yang, W. (2019). Nonbasal slip systems enable a strong and ductile hexagonal-close-packed high-entropy phase. *Physical Review Letters*, *122*(7), 75502. https://doi.org/10.1103/PhysRevLett.122.075502

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 8 of 87

50. Calcagnotto, M., Adachi, Y., Ponge, D., & Raabe, D. (2011). Deformation and fracture mechanisms in fine- and ultrafine-grained ferrite/martensite dual-phase steels and the effect of aging. *Acta Materialia*, *59*(2), 658–670. https://doi.org/10.1016/j.actamat.2010.10.002

51. Calcagnotto, M., Ponge, D., Demir, E., & Raabe, D. (2010). Orientation gradients and geometrically necessary dislocations in ultrafine grained dual-phase steels studied by 2D and 3D EBSD. *Materials Science and Engineering A*, *527*(10–11), 2738–2746. https://doi.org/10.1016/j.msea.2010.01.004

52. Calcagnotto, M., Ponge, D., & Raabe, D. (2008). Ultrafine grained ferrite/martensite dual phase steel fabricated by large strain warm deformation and subsequent intercritical annealing. *ISIJ International*, *48*(8), 1096–1101. https://doi.org/10.2355/isijinternational.48.1096

53. Calcagnotto, M., Ponge, D., & Raabe, D. (2010). Effect of grain refinement to 1μm on strength and toughness of dual-phase steels. *Materials Science and Engineering A*, *527*(29–30), 7832–7840. https://doi.org/10.1016/j.msea.2010.08.062

54. Calcagnotto, M., Ponge, D., & Raabe, D. (2012a). Microstructure control during fabrication of ultrafine grained dual-phase steel: characterization and effect of intercritical annealing parameters. *ISIJ International*, *52*(5), 874–883. https://doi.org/10.2355/isijinternational.52.874

55. Calcagnotto, M., Ponge, D., & Raabe, D. (2012b). On the effect of manganese on grain size stability and hardenability in ultrafine-grained ferrite/martensite dual-phase steels. *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, *43*(1), 37–46. https://doi.org/10.1007/s11661-011-0828-3

56. Cao, Y., Ma, D., & Raabe, D. (2009). The use of flat punch indentation to determine the viscoelastic properties in the time and frequency domains of a soft layer bonded to a rigid substrate. *Acta Biomaterialia*, *5*(1), 240–248. https://doi.org/10.1016/j.actbio.2008.07.020

57. Cao, Y., Xue, Z., Chen, X., & Raabe, D. (2008). Correlation between the flow stress and the nominal indentation hardness of soft metals. *Scripta Materialia*, *59*(5), 518–521. https://doi.org/10.1016/j.scriptamat.2008.04.039

58. Cédat, D., Fandeur, O., Rey, C., & Raabe, D. (2012). Polycrystal model of the mechanical behavior of a Mo–TiC30 vol.% metal–ceramic composite using a three-dimensional microstructure map obtained by dual beam focused ion beam scanning electron microscopy. *Acta Materialia*, *60*(4), 1623–1632. https://doi.org/10.1016/j.actamat.2011.11.055

59. Cereceda, D., Diehl, M., Roters, F., Raabe, D., Perlado, J. M., & Marian, J. (2016). Unraveling the temperature dependence of the yield strength in single-crystal tungsten using atomistically-informed crystal plasticity calculations. *International Journal of Plasticity*, *78*, 242–265. https://doi.org/10.1016/j.ijplas.2015.09.002

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 9 of 87

60. Cereceda, D., Diehl, M., Roters, F., Shanthraj, P., Raabe, D., Perlado, J. M., & Marian, J. (2015). Linking atomistic, kinetic Monte Carlo and crystal plasticity simulations of single-crystal tungsten strength. *GAMM Mitteilungen*, *38*(2), 213–227. https://doi.org/10.1002/gamm.201510012

61. Chang, Y., Breen, A. J. J., Tarzimoghadam, Z., Kürnsteiner, P., Gardner, H., Ackerman, A., Radecka, A., Bagot, P. A. J. A. J., Lu, W., Li, T., Jägle, E. A. A., Herbig, M., Stephenson, L. T. T., Moody, M. P. P., Rugg, D., Dye, D., Ponge, D., Raabe, D., & Gault, B. (2018). Characterizing solute hydrogen and hydrides in pure and alloyed titanium at the atomic scale. *Acta Materialia*, *150*, 273–280. https://doi.org/10.1016/j.actamat.2018.02.064

62. Chang, Y. H., Mouton, I., Stephenson, L., Ashton, M., Zhang, G. K., Szczpaniak, A., Lu, W. J., Ponge, D., Raabe, D., & Gault, B. (2019). Quantification of solute deuterium in titanium deuteride by atom probe tomography with both laser pulsing and high-voltage pulsing: influence of the surface electric field. *New Journal of Physics*, *21*(5), 53025. https://doi.org/10.1088/1367-2630/ab1c3b

63. Chang, Y., Lu, W., Guénolé, J., Stephenson, L. T., Szczpaniak, A., Kontis, P., Ackerman, A. K., Dear, F. F., Mouton, I., Zhong, X., Zhang, S., Dye, D., Liebscher, C. H., Ponge, D., Korte-Kerzel, S., Raabe, D., & Gault, B. (2019). Ti and its alloys as examples of cryogenic focused ion beam milling of environmentally-sensitive materials. *Nature Communications*, *10*(1). https://doi.org/10.1038/s41467-019-08752-7

64. Chang, Y., Zhang, S., Liebscher, C. H., Dye, D., Ponge, D., Scheu, C., Dehm, G., Raabe, D., Gault, B., & Lu, W. (2020). Could face-centered cubic titanium in cold-rolled commercially-pure titanium only be a Ti-hydride? *Scripta Materialia*, *178*, 39–43.

65. Chauvet, E., Kontis, P., Jägle, E. A., Gault, B., Raabe, D., Tassin, C., Blandin, J.-J. J., Dendievel, R., Vayre, B., Abed, S., & Martin, G. (2018). Hot cracking mechanism affecting a non-weldable Ni-based superalloy produced by selective electron Beam Melting. *Acta Materialia*, *142*, 82–94. https://doi.org/10.1016/j.actamat.2017.09.047

66. Chen, R., Sandlöbes, S., Zehnder, C., Zeng, X., Korte-Kerzel, S., & Raabe, D. (2018). Deformation mechanisms, activated slip systems and critical resolved shear stresses in an Mg-LPSO alloy studied by micro-pillar compression. *Materials and Design*, *154*, 203–216. https://doi.org/10.1016/j.matdes.2018.05.037

67. Chen, R., Sandlöbes, S., Zeng, X., Li, D., Korte-Kerzel, S., & Raabe, D. (2017). Room temperature deformation of LPSO structures by non-basal slip. *Materials Science and Engineering: A*, *682*(November 2016), 354–358. https://doi.org/10.1016/j.msea.2016.11.056

68. Chen, Y. Z., Herz, A., Li, Y. J., Borchers, C., Choi, P., Raabe, D., & Kirchheim, R. (2013). Nanocrystalline Fe-C alloys produced by ball milling of iron and graphite. *Acta Materialia*, *61*(9), 3172–3185. https://doi.org/10.1016/j.actamat.2013.02.006

69. Chikkadi, V., Mandal, S., Nienhuis, B., Raabe, D., Varnik, F., & Schall, P. (2012). Shear-induced anisotropic decay of correlations in hard-sphere colloidal glasses. *EPL (Europhysics Letters)*, *100*(5), 56001. https://doi.org/10.1209/0295-5075/100/56001

70. Choi, P., Li, Y. J., Kirchheim, R., & Raabe, D. (2011). Deformation-induced cementite decomposition in pearlitic steel wires studied by atom probe tomography. *ICCM International Conferences on Composite Materials*.

71. Choi, P. P., Povstugar, I., Ahn, J. P., Kostka, A., & Raabe, D. (2011). Thermal stability of TiAlN/CrN multilayer coatings studied by atom probe tomography. *Ultramicroscopy*, *111*(6), 518–523. https://doi.org/10.1016/j.ultramic.2010.11.012

72. Choi, P., Wuerz, R., & Raabe, D. (2012). *Exploring the p-n junction region in Cu (In , Ga) Se 2 thin-film solar cells at the*. *181603*, 1–5.

73. Choi, P.-P., Cojocaru-Mirédin, O., Abou-Ras, D., Caballero, R., Raabe, D., Smentkowski, V. S., Park, C. G., Gu, G. H., Mazumder, B., Wong, M. H., Hu, Y.-L., Melo, T. P., & Speck, J. S. (2012). Atom probe tomography of compound semiconductors for photovoltaic and light-emitting device applications. *Microscopy Today*, *20*(3), 18–24. https://doi.org/10.1017/s1551929512000235

74. Choi, P.-P. P., Cojocaru-Mirédin, O., Wuerz, R., & Raabe, D. (2011). Comparative atom probe study of Cu (In, Ga) Se2 thin-film solar cells deposited on soda-lime glass and mild steel substrates. *Journal of Applied Physics*, *110*(12), 124513. https://doi.org/10.1063/1.3665723

75. Choi, W. S., de Cooman, B. C., Sandlöbes, S., & Raabe, D. (2015). Size and orientation effects in partial dislocation-mediated deformation of twinning-induced plasticity steel micro-pillars. *Acta Materialia*, *98*, 391–404. https://doi.org/10.1016/j.actamat.2015.06.065

76. Choi, W. S., Sandlöbes, S., Malyar, N. v., Kirchlechner, C., Korte-Kerzel, S., Dehm, G., Choi, P. P., & Raabe, D. (2018). On the nature of twin boundary-associated strengthening in Fe-Mn-C steel. *Scripta Materialia*, *156*, 27–31. https://doi.org/10.1016/j.scriptamat.2018.07.009

77. Choi, W. S., Sandlöbes, S., Malyar, N. v., Kirchlechner, C., Korte-Kerzel, S., Dehm, G., de Cooman, B. C., & Raabe, D. (2017). Dislocation interaction and twinning-induced plasticity in face-centered cubic Fe-Mn-C micro-pillars. *Acta Materialia*, *132*, 162–173. https://doi.org/10.1016/j.actamat.2017.04.043

78. Choisez, L., van Rooij, N., Hessels, C., da Silva, A. K., Ma, Y., Souza Filho, I., de Goey, P., Springer, H., & Raabe, D. (2022). Phase Transformations and Microstructure Evolution During Combustion of Iron Powder. *Acta Materialia*, *239*, 118261. https://doi.org/10.2139/ssrn.4080963

79. Cojocaru-Mirédin, O., Abdellaoui, L., Nagli, M., Zhang, S., Yu, Y., Scheu, C., Raabe, D., Wuttig, M., & Amouyal, Y. (2017). Role of Nanostructuring and Microstructuring in Silver Antimony Telluride Compounds for Thermoelectric Applications. *ACS Applied Materials and Interfaces*, *9*(17), 14779–14790. https://doi.org/10.1021/acsami.7b00689

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 11 of 87

80. Cojocaru-Mirédin, O., Choi, P. P., Abou-Ras, D., Schmidt, S. S., Caballero, R., & Raabe, D. (2011). Characterization of grain boundaries in Cu(In,Ga)Se 2 films using atom-probe tomography. *IEEE Journal of Photovoltaics*, *1*(2), 207–212. https://doi.org/10.1109/JPHOTOV.2011.2170447

81. Cojocaru-Mirédin, O., Choi, P., Wuerz, R., & Raabe, D. (2011). Atomic-scale characterization of the CdS/CuInSe 2 interface in thin-film solar cells. *Applied Physics Letters*, *98*(10), 103504.

82. Cojocaru-Mirédin, O., Choi, P., Wuerz, R., & Raabe, D. (2012). Exploring the p-n junction region in Cu(In,Ga)Se 2 thin-film solar cells at the nanometer-scale. *Applied Physics Letters*, *101*(18). https://doi.org/10.1063/1.4764527

83. Cojocaru-Miredin, O., Choi, P., Wuerz, R., Raabe, D., Cojocaru-Mirédin, O., Choi, P., Wuerz, R., & Raabe, D. (2011). Atomic-scale distribution of impurities in CuInSe2-based thin-film solar cells. *Ultramicroscopy*, *111*(6), 552–556. https://doi.org/10.1016/j.ultramic.2010.12.034

84. Cojocaru-Mirédin, O., Fu, Y., Kostka, A., Sáez-Araoz, R., Beyer, A., Knaub, N., Volz, K., Fischer, C., & Raabe, D. (2015). Interface engineering and characterization at the atomic-scale of pure and mixed ion layer gas reaction buffer layers in chalcopyrite thin-film solar cells. *Progress in Photovoltaics: Research and Applications*, *23*(6), 705–716.

85. Cojocaru-Mirédin, O., Schwarz, T., Choi, P. P., Herbig, M., Wuerz, R., & Raabe, D. (2013a). Atom probe tomography studies on the Cu(In,ga)Se2 grain boundaries. *Journal of Visualized Experiments : JoVE*, *74*, 1–8. https://doi.org/10.3791/50376

86. Cojocaru-Mirédin, O., Schwarz, T., Choi, P.-P., Herbig, M., Wuerz, R., & Raabe, D. (2013b). Atom probe tomography studies on the Cu (In, Ga) Se2 grain boundaries. *Journal of Visualized Experiments: JoVE*, *74*.

87. Colombara, D., Elanzeery, H., Nicoara, N., Sharma, D., Claro, M., Schwarz, T., Koprek, A., Wolter, M. H., Melchiorre, M., Sood, M., Valle, N., Bondarchuk, O., Babbe, F., Spindler, C., Cojocaru-Miredin, O., Raabe, D., Dale, P. J., Sadewasser, S., & Siebentritt, S. (2020). Chemical instability at chalcogenide surfaces impacts chalcopyrite devices well beyond the surface. *Nature Communications*, *11*(1), 1–14. https://doi.org/10.1038/s41467-020-17434-8

88. Colombara, D., Werner, F., Schwarz, T., Infante, I. C., Fleming, Y., Valle, N., Spindler, C., Vacchieri, E., Rey, G., Guennou, M., Cañero Infante, I., Fleming, Y., Valle, N., Spindler, C., Vacchieri, E., Rey, G., Guennou, M., Bouttemy, M., Manjón, A. G., … Siebentritt, S. (2018). Sodium enhances indium-gallium interdiffusion in copper indium gallium diselenide photovoltaic absorbers. *Nature Communications*, *9*(1), 1–12. https://doi.org/10.1038/s41467-018-03115-0

89. Counts, W. A., Friák, M., Battaile, C. C., Raabe, D., & Neugebauer, J. (2008). A comparison of polycrystalline elastic properties computed by analytic homogenization schemes and FEM. *Physica Status Solidi (b)*, *245*(12), 2630–2635. https://doi.org/10.1002/pssb.200844226

90. Counts, W. A., Friak, M., Raabe, D., & Neugebauer, J. (2009). Using ab initio calculations in designing bcc Mg–Li alloys for ultra-lightweight applications. *Acta Materialia*, *57*(1), 69–76.

91. Counts, W. A., Friak, M., Raabe, D., & Neugebauer, J. (2010). Ab Initio Guided Design of bcc Ternary Mg–Li–X (X= Ca, Al, Si, Zn, Cu) Alloys for Ultra-Lightweight Applications. *Advanced Engineering Materials*, *12*(7), 572–576.

92. Counts, W. A., Friák, M., Raabe, D., & Neugebauer, J. (2010a). Ab Initio guided design of bcc ternary Mg-Li-X (X=Ca, Al, Si, Zn, Cu) alloys for ultra-lightweight applications. *Advanced Engineering Materials*, *12*(7), 572–576. https://doi.org/10.1002/adem.200900308

93. Counts, W. A., Friák, M., Raabe, D., & Neugebauer, J. (2010b). Using Ab initio calculations in designing bcc MgLi-X alloys for ultra-lightweight applications. *Advanced Engineering Materials*, *12*(12), 1198–1205. https://doi.org/10.1002/adem.201000225

94. Darvishi Kamachali, R., Kwiatkowski da Silva, A., McEniry, E., Ponge, D., Gault, B., Neugebauer, J., & Raabe, D. (2020). Segregation-assisted spinodal and transient spinodal phase separation at grain boundaries. *Npj Computational Materials*, *6*(1), 1–13. https://doi.org/10.1038/s41524-020-00456-7

95. Darvishi Kamachali, R., Schwarze, C., Lin, M., Diehl, M., Shanthraj, P., Prahl, U., Steinbach, I., Raabe, D., Kamachali, R. D., Schwarze, C., Lin, M., Diehl, M., Shanthraj, P., Prahl, U., Steinbach, I., Raabe, D., Darvishi Kamachali, R., Schwarze, C., Lin, M., … Raabe, D. (2018). Numerical Benchmark of Phase-Field Simulations with Elastic Strains: Precipitation in the Presence of Chemo-Mechanical Coupling. *Computational Materials Science*, *155*(September), 541–553. https://doi.org/10.1016/j.commatsci.2018.09.011

96. de Siqueira, R. P., Sandim, H. R. Z., & Raabe, D. (2013). Particle stimulated nucleation in coarse-grained ferritic stainless steel. *Metallurgical and Materials Transactions A*, *44*(1), 469–478. https://doi.org/10.1007/s11661-012-1408-x

97. Demir, E., & Raabe, D. (2010). Mechanical and microstructural single-crystal Bauschinger effects: Observation of reversible plasticity in copper during bending. *Acta Materialia*, *58*(18), 6055–6063. https://doi.org/10.1016/j.actamat.2010.07.023

98. Demir, E., Raabe, D., & Roters, F. (2010). The mechanical size effect as a mean-field breakdown phenomenon: Example of microscale single crystal beam bending. *Acta Materialia*, *58*(5), 1876–1886. https://doi.org/10.1016/j.actamat.2009.11.031

99. Demir, E., Raabe, D., Zaafarani, N., & Zaefferer, S. (2009a). Experimental investigation of geometrically necessary dislocations beneath small indents of different depths using EBSD tomography. *Acta Materialia*, *57*, 559–569.

100. Demir, E., Raabe, D., Zaafarani, N., & Zaefferer, S. (2009b). Investigation of the indentation size effect through the measurement of the geometrically necessary dislocations beneath small indents of different depths using EBSD

tomography. *Acta Materialia*, *57*(2), 559–569. https://doi.org/10.1016/j.actamat.2008.09.039

101. Demir, E., Roters, F., & Raabe, D. (2010). Bending of single crystal microcantilever beams of cube orientation: Finite element model and experiments. *Journal of the Mechanics and Physics of Solids*, *58*(10), 1599–1612. https://doi.org/10.1016/j.jmps.2010.07.007

102. Deng, Y., Tasan, C. C., Pradeep, K. G., Springer, H., Kostka, A., & Raabe, D. (2015). Design of a twinning-induced plasticity high entropy alloy. *Acta Materialia*, *94*, 124–133. https://doi.org/10.1016/j.actamat.2015.04.014

103. Dey, P., Nazarov, R., Dutta, B., Yao, M., Herbig, M., Friák, M., Hickel, T., Raabe, D., & Neugebauer, J. (2017). Ab initio explanation of disorder and off-stoichiometry in Fe-Mn-Al-C κ carbides. *Physical Review B*, *95*(10), 104108. https://doi.org/10.1103/PhysRevB.95.104108

104. Diehl, M., An, D., Shanthraj, P., Zaefferer, S., Roters, F., & Raabe, D. (2017). Crystal plasticity study on stress and strain partitioning in a measured 3D dual phase steel microstructure. *Physical Mesomechanics*, *20*(3), 311–323. https://doi.org/10.1134/S1029959917030079

105. Diehl, M., Groeber, M., Haase, C., Molodov, D. A., Roters, F., & Raabe, D. (2017). Identifying Structure–Property Relationships Through DREAM.3D Representative Volume Elements and DAMASK Crystal Plasticity Simulations: An Integrated Computational Materials Engineering Approach. *JOM*, *69*(5), 848–855. https://doi.org/10.1007/s11837-017-2303-0

106. Diehl, M., Kertsch, L., Traka, K., Helm, D., & Raabe, D. (2019). Site-specific quasi in situ investigation of primary static recrystallization in a low carbon steel. *Materials Science and Engineering: A*, *755*, 295–306.

107. Diehl, M., Wicke, M., Shanthraj, P., Roters, F., Brueckner-Foit, A., & Raabe, D. (2017). Coupled Crystal Plasticity–Phase Field Fracture Simulation Study on Damage Evolution Around a Void: Pore Shape Versus Crystallographic Orientation. *JOM*, *69*(5), 872–878. https://doi.org/10.1007/s11837-017-2308-8

108. Ding, R., Yao, Y., Sun, B., Liu, G., He, J., Li, T., Wan, X., Dai, Z., Ponge, D., Raabe, D., Zhang, C., Godfrey, A., Miyamoto, G., Furuhara, T., Yang, Z., van der Zwaag, S., & Chen, H. (2020). Chemical boundary engineering: A new route toward lean, ultrastrong yet ductile steels. *Science Advances*, *6*(13), eaay1430. https://doi.org/10.1126/sciadv.aay1430

109. Djaziri, S., Li, Y., Nematollahi, Gh. A., Grabowski, B., Goto, S., Kirchlechner, C., Kostka, A., Doyle, S., Neugebauer, J., Raabe, D., & Dehm, G. (2016). Deformation-induced martensite: a new paradigm for exceptional steels. *Advanced Materials*, *28*(35), 7753–7757. https://doi.org/10.1002/adma.201601526

110. Dmitrieva, O., Choi, P., Gerstl, S. S. A., Ponge, D., & Raabe, D. (2011). Pulsed-laser atom probe studies of a precipitation hardened maraging TRIP steel. *Ultramicroscopy*, *111*(6), 623–627. https://doi.org/10.1016/j.ultramic.2010.12.007

111. Dmitrieva, O., Dondl, P. W., Müller, S., & Raabe, D. (2009). Lamination microstructure in shear deformed copper single crystals. *Acta Materialia*, *57*(12), 3439–3449. https://doi.org/10.1016/j.actamat.2009.03.035

112. Dmitrieva, O., Ponge, D., Inden, G., Millán, J., Choi, P., Sietsma, J., & Raabe, D. (2011). Chemical gradients across phase boundaries between martensite and austenite in steel studied by atom probe tomography and simulation. *Acta Materialia*, *59*(1), 364–374. https://doi.org/10.1016/j.actamat.2010.09.042

113. Dmitrieva, O., Svirina, J. v., Demir, E., & Raabe, D. (2010). Investigation of the internal substructure of microbands in a deformed copper single crystal: experiments and dislocation dynamics simulation. *Modelling and Simulation in Materials Science and Engineering*, *18*(8), 85011. https://doi.org/10.1088/0965-0393/18/8/085011

114. Duarte, M. J., Klemm, J., Klemm, S. O., Mayrhofer, K. J. J., Stratmann, M., Borodin, S., Romero, A. H., Madinehei, M., Crespo, D., Serrano, J., Gerstl, S. S. A., Choi, P. P., Raabe, D., & Renner, F. U. (2013). Element-resolved corrosion analysis of stainless-type glass-forming steels. *Science*, *341*(6144), 372–376. https://doi.org/10.1126/science.1230081

115. Duarte, M. J., Kostka, A., Jimenez, J. A., Choi, P., Klemm, J., Crespo, D., Raabe, D., & Renner, F. U. (2014). Crystallization, phase evolution and corrosion of Fe-based metallic glasses: An atomic-scale structural and chemical characterization study. *Acta Materialia*, *71*, 20–30. https://doi.org/10.1016/j.actamat.2014.02.027

116. Dutta, A., Ponge, D., Sandlöbes, S., & Raabe, D. (2019). Strain partitioning and strain localization in medium manganese steels measured by in situ microscopic digital image correlation. *Materialia*, *5*(February), 100252. https://doi.org/10.1016/j.mtla.2019.100252

117. Eiselt, C. C., Klimenkov, M., Lindau, R., Möslang, A., Sandim, H. R. Z. Z., Padilha, A. F., & Raabe, D. (2009). High-resolution transmission electron microscopy and electron backscatter diffraction in nanoscaled ferritic and ferritic–martensitic oxide dispersion strengthened–steels. *Journal of Nuclear Materials*, *385*(2), 231–235. https://doi.org/10.1016/j.jnucmat.2008.11.029

118. Eisenlohr, A., Gutierrez-Urrutia, I., & Raabe, D. (2012). Adiabatic temperature increase associated with deformation twinning and dislocation plasticity. *Acta Materialia*, *60*(9), 3994–4004. https://doi.org/10.1016/j.actamat.2012.03.008

119. Eisenlohr, P., Tjahjanto, D. D., Hochrainer, T., Roters, F., & Raabe, D. (2009a). Comparison of texture evolution in fcc metals predicted by various grain cluster homogenization schemes. *International Journal of Materials Research*, *100*(4), 500–509. https://doi.org/10.3139/146.110071

120. Eisenlohr, P., Tjahjanto, D. D., Hochrainer, T., Roters, F., & Raabe, D. (2009b). Texture prediction from a novel grain cluster-based homogenization scheme. *International Journal of Material Forming*, *2*(1), 523–526.

121. Elkot, M. N., Sun, B., Zhou, X., Ponge, D., & Raabe, D. (2022). Hydrogen-assisted decohesion associated with nanosized grain boundary κ-carbides in a high-Mn

lightweight steel. *Acta Materialia*, *241*, 118392. https://doi.org/10.1016/J.ACTAMAT.2022.118392

122. Elstnerová, P., Friák, M., Fabritius, H. O., Lymperakis, L., Hickel, T., Petrov, M., Nikolov, S., Raabe, D., Ziegler, A., Hild, S., & Neugebauer, J. (2010). Ab initio study of thermodynamic, structural, and elastic properties of Mg-substituted crystalline calcite. *Acta Biomaterialia*, *6*(12), 4506–4512. https://doi.org/10.1016/j.actbio.2010.07.015

123. El-Zoka, A. A., Stephenson, L. T., Kim, S. H., Gault, B., & Raabe, D. (2023). The Fate of Water in Hydrogen-Based Iron Oxide Reduction. *Advanced Science*, *2300626*, 1–8. https://doi.org/10.1002/advs.202300626

124. Enax, J., Fabritius, H.-O. O., Rack, A., Prymak, O., Raabe, D., & Epple, M. (2013). Characterization of crocodile teeth: correlation of composition, microstructure, and hardness. *Journal of Structural Biology*, *184*(2), 155–163. https://doi.org/10.1016/j.jsb.2013.09.018

125. Enax, J., Janus, A. M., Raabe, D., Epple, M., & Fabritius, H.-O. O. (2014). Ultrastructural organization and micromechanical properties of shark tooth enameloid. *Acta Biomaterialia*, *10*(9), 3959–3968. https://doi.org/10.1016/j.actbio.2014.04.028

126. Enax, J., Prymak, O., Raabe, D., & Epple, M. (2012). Structure, composition, and mechanical properties of shark teeth. *Journal of Structural Biology*, *178*(3), 290–299.

127. Ener, S., Skokov, K. P., Palanisamy, D., Devillers, T., Fischbacher, J., Eslava, G. G., Maccari, F., Schäfer, L., Diop, L. V. B., & Radulov, I. (2021). Twins–A weak link in the magnetic hardening of ThMn12-type permanent magnets. *Acta Materialia*, *214*, 116968.

128. Eswarappa Prameela, S., Pollock, T. M., Raabe, D., Meyers, M. A., Aitkaliyeva, A., Chintersingh, K.-L., Cordero, Z. C., & Graham-Brady, L. (2022). Materials for extreme environments. *Nature Reviews Materials*, 1–8. https://doi.org/10.1038/s41578-022-00496-z

129. Evertz, S., Kirchlechner, I., Soler, R., Kirchlechner, C., Kontis, P., Bednarcik, J., Gault, B., Dehm, G., Raabe, D., & Schneider, J. M. (2020). Electronic structure based design of thin film metallic glasses with superior fracture toughness. *Materials & Design*, *186*, 108327.

130. Evertz, S., Schnabel, V., Köhler, M., Kirchlechner, I., Kontis, P., Chen, Y.-T. T., Soler, R., Jaya, B. N., Kirchlechner, C., Music, D., Gault, B., Schneider, J. M., Raabe, D., & Dehm, G. (2020). Review on quantum mechanically guided design of ultra-strong metallic glasses. *Frontiers in Materials*, *7*(April), 89. https://doi.org/10.3389/fmats.2020.00089

131. Fabritius, H. O., Sachs, C., Triguero, P. R., & Raabe, D. (2009). Influence of structural principles on the mechanics of a biological fiber-based composite material with hierarchical organization: the exoskeleton of the lobster Homarus americanus. *Advanced Materials*, *21*(4), 391–400. https://doi.org/10.1002/adma.200801219

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 16 of 87

132. Fabritius, H.-O. O., Karsten, E. S., Balasundaram, K., Hild, S., Huemer, K., & Raabe, D. (2012). Correlation of structure, composition and local mechanical properties in the dorsal carapace of the edible crab Cancer pagurus. *Zeitschrift Für Kristallographie-Crystalline Materials*, *227*(11), 766–776. https://doi.org/10.1524/zkri.2012.1532

133. Fabritius, H.-O. O., Ziegler, A., Friák, M., Nikolov, S., Huber, J., Seidl, B. H. M. M., Ruangchai, S., Alagboso, F. I., Karsten, S., Lu, J., Janus, A. M., Petrov, M., Zhu, L. F., Hemzalová, P., Hild, S., Raabe, D., & Neugebauer, J. (2016). Functional adaptation of crustacean exoskeletal elements through structural and compositional diversity: a combined experimental and theoretical study. *Bioinspiration & Biomimetics*, *11*(5), 55006. https://doi.org/10.1088/1748-3190/11/5/055006

134. Fabritius-Vilpoux, K., Enax, J., Herbig, M., Raabe, D., & Fabritius, H.-O. O. (2019). Quantitative affinity parameters of synthetic hydroxyapatite and enamel surfaces in vitro. *Bioinspired, Biomimetic and Nanobiomaterials*, *8*(2), 141–153. https://doi.org/10.1680/jbibn.18.00035

135. Fan, H., Wang, Q., El-Awady, J. A., Raabe, D., & Zaiser, M. (2021). Strain rate dependency of dislocation plasticity. *Nature Communications*, *12*(1), 1–11.

136. Fan, H., Zhu, Y., El-Awady, J. A., & Raabe, D. (2018). Precipitation hardening effects on extension twinning in magnesium alloys. *International Journal of Plasticity*, *106*(November 2017), 186–202. https://doi.org/10.1016/j.ijplas.2018.03.008

137. Fedosseev, A. I., & Raabe, D. (1994). Application of the method of superposition of harmonic currents for the simulation of inhomogeneous deformation during hot rolling of FeCr. *Scripta Metallurgica et Materiala*, *30*(1), 1–6. https://doi.org/10.1016/0956-716X(94)90348-4

138. Fischle, A., Neff, P., & Raabe, D. (2017). The relaxed-polar mechanism of locally optimal Cosserat rotations for an idealized nanoindentation and comparison with 3D-EBSD experiments. *Zeitschrift Für Angewandte Mathematik Und Physik*, *68*(4), 1–30.

139. Friák, M., Counts, W. A., Ma, D., Sander, B., Holec, D., Raabe, D., & Neugebauer, J. (2012). Theory-guided materials design of multi-phase Ti-Nb alloys with bone-matching elastic properties. *Materials*, *5*(10), 1853–1872. https://doi.org/10.3390/ma5101853

140. Friak, M., Counts, W. A., Raabe, D., Neugebauer, J., Friák, M., Counts, W. A., Raabe, D., & Neugebauer, J. (2008). Error propagation in multiscale approaches to the elasticity of polycrystals. *Physica Status Solidi (b)*, *245*(12), 2636–2641. https://doi.org/10.1002/pssb.200844240

141. Friák, M., Hickel, T., Grabowski, B., Lymperakis, L., Udyansky, A., Dick, A., Ma, D., Roters, F., Zhu, L. F., Schlieter, A., Kühn, U., Ebrahimi, Z., Lebensohn, R. A., Holec, D., Eckert, J., Emmerich, H., Raabe, D., & Neugebauer, J. (2011). Methodological challenges in combining quantum-mechanical and continuum approaches for materials science applications. *European Physical Journal Plus*, *126*(10), 1–22. https://doi.org/10.1140/epjp/i2011-11101-2

142. Friák, M., Hickel, T., Körmann, F., Udyansky, A., Dick, A., von Pezold, J., Ma, D., Kim, O., Counts, W. A., Šob, M., Gebhardt, T., Music, D., Schneider, J., Raabe, D., & Neugebauer, J. (2011). Determining the elasticity of materials employing quantum-mechanical approaches from the electronic ground state to the limits of materials stability. *Steel Research International*, *82*(2), 86–100. https://doi.org/10.1002/srin.201000264

143. Friak, M., Nikolov, S., Petrov, M., Elstnerova, P., Sachs, C., Fabritius, H., Ma, D., Lymperakis, L., Raabe, D., & Neugebauer, J. (2010). Ab initio based study of multiscale elastic properties of hierarchical biocomposites. *Advanced Materials*, *22*, 519.

144. Friak, M., Sander, B., Raabe, D., & Neugebauer, J. (2008). Theory-guided design of Ti-based binaries for human implants. *Journal of Physics: Condensed Matter*, *20*(6), 64221.

145. Friák, M., Tytko, D., Holec, D., Choi, P. P., Eisenlohr, P., Raabe, D., & Neugebauer, J. (2015). Synergy of atom-probe structural data and quantum-mechanical calculations in a theory-guided design of extreme-stiffness superlattices containing metastable phases. *New Journal of Physics*, *17*(9), 13–16. https://doi.org/10.1088/1367-2630/17/9/093004

146. Frommert, M., Zobrist, C., Lahn, L., Böttcher, A., Raabe, D., & Zaefferer, S. (2008). Texture measurement of grain-oriented electrical steels after secondary recrystallization. *Journal of Magnetism and Magnetic Materials*, *320*(20), 657–660. https://doi.org/10.1016/j.jmmm.2008.04.102

147. Fujita, N., Igi, S., Diehl, M., Roters, F., & Raabe, D. (2019). The through-process texture analysis of plate rolling by coupling finite element and fast Fourier transform crystal plasticity analysis. *Modelling and Simulation in Materials Science and Engineering*, *27*(8), 85005.

148. Fujita, N., Ishikawa, N., Roters, F., Tasan, C. C., & Raabe, D. (2018). Experimental-numerical study on strain and stress partitioning in bainitic steels with martensite-austenite constituents. *International Journal of Plasticity*, *104*(August 2017), 39–53. https://doi.org/10.1016/j.ijplas.2018.01.012

149. Garbe, S., Juul Jensen, D., Poulsen, H. F., Krieger Lassen, N. C., & Raabe, D. (1998). Through-thickness texture variations determined non-destructively by high energy synchrotron radiation. *Materials Science Forum*, *273*, 271–276.

150. Gault, B., Breen, A. J., Chang, Y., He, J., Jägle, E. A., Kontis, P., Kürnsteiner, P., Kwiatkowski Da Silva, A., Makineni, S. K., Mouton, I., Peng, Z., Ponge, D., Schwarz, T., Stephenson, L. T., Szczepaniak, A., Zhao, H., & Raabe, D. (2018). Interfaces and defect composition at the near-atomic scale through atom probe tomography investigations. *Journal of Materials Research*, *33*(23), 4018–4030. https://doi.org/10.1557/jmr.2018.375

151. George, E. P., Raabe, D., & Ritchie, R. O. (2019). High-entropy alloys. *Nature Reviews Materials*, *4*(8), 515–534. https://doi.org/10.1038/s41578-019-0121-4

152. Godara, A., & Raabe, D. (2007). Influence of fiber orientation on global mechanical behavior and mesoscale strain localization in a short glass-fiber-reinforced

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 18 of 87

epoxy polymer composite during tensile deformation investigated using digital image correlation. *Composites Science and Technology*, *67*(11–12), 2417–2427. https://doi.org/10.1016/j.compscitech.2007.01.005

153. Godara, A., Raabe, D., Bergmann, I., Putz, R., & Müller, U. (2009). Influence of additives on the global mechanical behavior and the microscopic strain localization in wood reinforced polypropylene composites during tensile deformation investigated using digital image correlation. *Composites Science and Technology*, *69*(2), 139–146. https://doi.org/10.1016/j.compscitech.2008.08.031

154. Godara, A., Raabe, D., & Green, S. (2007). The influence of sterilization processes on the micromechanical properties of carbon fiber-reinforced PEEK composites for bone implant applications. *Acta Biomaterialia*, *3*(2), 209–220. https://doi.org/10.1016/j.actbio.2006.11.005

155. Godara, A., Raabe, D., van Puyvelde, P., & Moldenaers, P. (2006). Influence of flow on the global crystallization kinetics of iso-tactic polypropylene. *Polymer Testing*, *25*(4), 460–469. https://doi.org/10.1016/j.polymertesting.2006.01.010

156. Goetz, A. J., Steinmetz, D. R., Griesshaber, E., Zaefferer, S., Raabe, D., Kelm, K., Irsen, S., Sehrbrock, A., & Schmahl, W. W. (2011). Interdigitating biocalcite dendrites form a 3-D jigsaw structure in brachiopod shells. *Acta Biomaterialia*, *7*(5), 2237–2243. https://doi.org/10.1016/j.actbio.2011.01.035

157. Gottstein, G., & Raabe, D. (1998). Integral modeling of metallic materials. *Current Opinion in Solid State and Materials Science*, *3*(3), 264–268. https://doi.org/10.1016/S1359-0286(98)80101-0

158. Grilli, N., Janssens, K. G. F. F., Nellessen, J., Sandlöbes, S., & Raabe, D. (2018). Multiple slip dislocation patterning in a dislocation-based crystal plasticity finite element method. *International Journal of Plasticity*, *100*, 104–121. https://doi.org/10.1016/j.ijplas.2017.09.015

159. Gross, M., Steinbach, I., Raabe, D., & Varnik, F. (2013). Viscous coalescence of droplets: A lattice Boltzmann study. *Physics of Fluids*, *25*(5), 52101. https://doi.org/10.1063/1.4803178

160. Gross, M., Varnik, F., & Raabe, D. (2009). Fall and rise of small droplets on rough hydrophobic substrates. *Europhysics Letters*, *88*(2), 1–6. https://doi.org/10.1209/0295-5075/88/26002

161. Gross, M., Varnik, F., Raabe, D., & Steinbach, I. (2010). Small droplets on superhydrophobic substrates. *Physical Review E*, *81*(5), 51606. https://doi.org/10.1103/PhysRevE.81.051606

162. Guillon, O., Elsässer, C., Gutfleisch, O., Janek, J., Korte-Kerzel, S., Raabe, D., & Volkert, C. A. (2018). Manipulation of matter by electric and magnetic fields: Toward novel synthesis and processing routes of inorganic materials. *Materials Today*, *21*(5), 527–536. https://doi.org/10.1016/j.mattod.2018.03.026

163. Guo, W., Gan, B., Molina-Aldareguia, J. M., Poplawsky, J. D., & Raabe, D. (2016). Structure and dynamics of shear bands in amorphous–crystalline nanolaminates. *Scripta Materialia*, *110*, 28–32.

164. Guo, W., Jägle, E. A., Choi, P. P., Yao, J., Kostka, A., Schneider, J. M., & Raabe, D. (2014a). Erratum: Shear-induced mixing governs codeformation of crystalline-amorphous nanolaminates (Physical Review Letters (2014) 113 (035501)). *Physical Review Letters*, *113*(6), 69903. https://doi.org/10.1103/PhysRevLett.113.069903

165. Guo, W., Jägle, E. A., Choi, P.-P. P., Yao, J., Kostka, A., Schneider, J. M., & Raabe, D. (2014b). Shear-induced mixing governs codeformation of crystalline-amorphous nanolaminates. *Physical Review Letters*, *113*(3), 35501. https://doi.org/10.1103/PhysRevLett.113.035501

166. Guo, W., Jägle, E., Yao, J., Maier, V., Korte-Kerzel, S., Schneider, J. M., & Raabe, D. (2014). Intrinsic and extrinsic size effects in the deformation of amorphous CuZr/nanocrystalline Cu nanolaminates. *Acta Materialia*, *80*, 94–106. https://doi.org/10.1016/j.actamat.2014.07.027

167. Guo, W., Pei, Z., Sang, X., Poplawsky, J. D., Bruschi, S., Qu, J., Raabe, D., & Bei, H. (2019). Shape-preserving machining produces gradient nanolaminate medium entropy alloys with high strain hardening capability. *Acta Materialia*, *170*, 176–186. https://doi.org/10.1016/j.actamat.2019.03.024

168. Guo, W., Yao, J., Jägle, E. A., Choi, P. P., Herbig, M., Schneider, J. M., & Raabe, D. (2015). Deformation induced alloying in crystalline - metallic glass nano-composites. *Materials Science and Engineering A*, *628*, 269–280. https://doi.org/10.1016/j.msea.2015.01.062

169. Gutierrez-Urrutia, I., Böttcher, A., Lahn, L., Raabe, D., Gutiérrez-Urrutia, I., Böttcher, A., Lahn, L., & Raabe, D. (2014). Microstructure–magnetic property relations in grain-oriented electrical steels: quantitative analysis of the sharpness of the Goss orientation. *Journal of Materials Science*, *49*(1), 269–276. https://doi.org/10.1007/s10853-013-7701-2

170. Gutierrez-Urrutia, I., del Valle, J. A., Zaefferer, S., & Raabe, D. (2010). Study of internal stresses in a TWIP steel analyzing transient and permanent softening during reverse shear tests. *Journal of Materials Science*, *45*(24), 6604–6610. https://doi.org/10.1007/s10853-010-4750-7

171. Gutierrez-Urrutia, I., & Raabe, D. (2011). Dislocation and twin substructure evolution during strain hardening of an Fe-22 wt.% Mn-0.6 wt.% C TWIP steel observed by electron channeling contrast imaging. *Acta Materialia*, *59*(16), 6449–6462. https://doi.org/10.1016/j.actamat.2011.07.009

172. Gutierrez-Urrutia, I., & Raabe, D. (2012a). Dislocation density measurement by electron channeling contrast imaging in a scanning electron microscope. *Scripta Materialia*, *66*(6), 343–346. https://doi.org/10.1016/j.scriptamat.2011.11.027

173. Gutierrez-Urrutia, I., & Raabe, D. (2012b). Grain size effect on strain hardening in twinning-induced plasticity steels. *Scripta Materialia*, *66*(12), 992–996. https://doi.org/10.1016/j.scriptamat.2012.01.037

174. Gutierrez-Urrutia, I., & Raabe, D. (2012c). Study of deformation twinning and planar slip in a TWIP steel by electron channeling contrast imaging in a SEM.

Materials Science Forum, *702–703*, 523–529. https://doi.org/10.4028/www.scientific.net/MSF.702-703.523

175. Gutierrez-Urrutia, I., & Raabe, D. (2013a). Influence of Al content and precipitation state on the mechanical behavior of austenitic high-Mn low-density steels. *Scripta Materialia*, *68*(6), 343–347. https://doi.org/10.1016/j.scriptamat.2012.08.038

176. Gutiérrez-Urrutia, I., & Raabe, D. (2013). Microbanding mechanism in an Fe–Mn–C high-Mn twinning-induced plasticity steel. *Scripta Materialia*, *69*(1), 53–56.

177. Gutierrez-Urrutia, I., & Raabe, D. (2013b). Microbanding mechanism in an Fe-Mn-C high-Mn twinning-induced plasticity steel. *Scripta Materialia*, *69*(1), 53–56. https://doi.org/10.1016/j.scriptamat.2013.03.010

178. Gutierrez-Urrutia, I., & Raabe, D. (2014). High strength and ductile low density austenitic FeMnAlC steels: Simplex and alloys strengthened by nanoscale ordered carbides. *Materials Science and Technology (United Kingdom)*, *30*(9), 1099–1104. https://doi.org/10.1179/1743284714Y.0000000515

179. Gutierrez-Urrutia, I., Raabe, D., Gutiérrez-Urrutia, I., & Raabe, D. (2012). Multistage strain hardening through dislocation substructure and twinning in a high strength and ductile weight-reduced Fe–Mn–Al–C steel. *Acta Materialia*, *60*(16), 5791–5802. https://doi.org/10.1016/j.actamat.2012.07.018

180. Gutierrez-Urrutia, I., Zaefferer, S., & Raabe, D. (2009). Electron channeling contrast imaging of twins and dislocations in twinning-induced plasticity steels under controlled diffraction conditions in a scanning electron microscope. *Scripta Materialia*, *61*(7), 737–740. https://doi.org/10.1016/j.scriptamat.2009.06.018

181. Gutierrez-Urrutia, I., Zaefferer, S., & Raabe, D. (2010). The effect of grain size and grain orientation on deformation twinning in a Fe-22wt.% Mn-0.6wt.% C TWIP steel. *Materials Science and Engineering A*, *527*(15), 3552–3560. https://doi.org/10.1016/j.msea.2010.02.041

182. Gutierrez-Urrutia, I., Zaefferer, S., & Raabe, D. (2013). Coupling of electron channeling with EBSD: Toward the quantitative characterization of deformation structures in the sem. *JOM*, *65*(9), 1229–1236. https://doi.org/10.1007/s11837-013-0678-0

183. Hafez Haghighat, S. M., Eggeler, G., Raabe, D., Hafez, S. M., Haghighat, G. E., Raabe, D., Haghighat, S. M. H., Eggeler, G., & Raabe, D. (2013). Effect of climb on dislocation mechanisms and creep rates in γ'-strengthened Ni base superalloy single crystals: A discrete dislocation dynamics study. *Acta Materialia*, *61*(10), 3709–3723. https://doi.org/10.1016/j.actamat.2013.03.003

184. Haghighat, S. M. H., Schäublin, R., Raabe, D., Hafez Haghighat, S. M., Schäublin, R., & Raabe, D. (2014). Atomistic simulation of the a0< 1 0 0> binary junction formation and its unzipping in body-centered cubic iron. *Acta Materialia*, *64*, 24–32. https://doi.org/10.1016/j.actamat.2013.11.037

185. Haghighat, S. M. H., von Pezold, J., Race, C. P., Körmann, F., Friák, M., Neugebauer, J., Raabe, D., Hafez Haghighat, S. M., von Pezold, J., Race, C. P., Körmann, F., Friák, M., Neugebauer, J., & Raabe, D. (2014). Influence of the dislocation core

on the glide of the ½< 1 1 1>{1 1 0} edge dislocation in bcc-iron: An embedded atom method study. *Computational Materials Science*, *87*, 274–282. https://doi.org/10.1016/j.commatsci.2014.02.031

186. Haley, D., Choi, P., & Raabe, D. (2015). Guided mass spectrum labelling in atom probe tomography. *Ultramicroscopy*, *159*, 338–345. https://doi.org/10.1016/j.ultramic.2015.03.005

187. Haley, D., Merzlikin, S. v., Choi, P., & Raabe, D. (2014). Atom probe tomography observation of hydrogen in high-Mn steel and silver charged via an electrolytic route. *International Journal of Hydrogen Energy*, *39*(23), 12221–12229. https://doi.org/10.1016/j.ijhydene.2014.05.169

188. Han, C. S., Ma, A., Roters, F., & Raabe, D. (2007). A Finite Element approach with patch projection for strain gradient plasticity formulations. *International Journal of Plasticity*, *23*(4), 690–710. https://doi.org/10.1016/j.ijplas.2006.08.003

189. Han, F., Diehl, M., Roters, F., & Raabe, D. (2020). Using spectral-based representative volume element crystal plasticity simulations to predict yield surface evolution during large scale forming simulations. *Journal of Materials Processing Technology*, *277*(September 2019), 116449. https://doi.org/10.1016/j.jmatprotec.2019.116449

190. Han, F., Roters, F., & Raabe, D. (2020). Microstructure-based multiscale modeling of large strain plastic deformation by coupling a full-field crystal plasticity-spectral solver with an implicit finite element solver. *International Journal of Plasticity*, *125*(September 2019), 97–117. https://doi.org/10.1016/j.ijplas.2019.09.004

191. Han, J., da Silva, A. K., Ponge, D., Raabe, D., Lee, S. M., Lee, Y. K., Lee, S. I., & Hwang, B. (2017). The effects of prior austenite grain boundaries and microstructural morphology on the impact toughness of intercritically annealed medium Mn steel. *Acta Materialia*, *122*, 199–206. https://doi.org/10.1016/j.actamat.2016.09.048

192. Han, J., Kang, S. H., Lee, S. J., Kawasaki, M., Lee, H. J., Ponge, D., Raabe, D., & Lee, Y. K. (2017). Superplasticity in a lean Fe-Mn-Al steel. *Nature Communications*, *8*(1), 8–13. https://doi.org/10.1038/s41467-017-00814-y

193. Han, J., Kang, S.-H., Lee, S.-J., Kawasaki, M., Lee, H.-J., Ponge, D., Raabe, D., & Lee, Y.-K. (2018). Superplasticity in a lean Fe-Mn-Al steel (vol 8, 2017). *Nature Communications*, *9*(1).

194. Han, L., Wang, J., Peter, N. J., Maccari, F., Kovács, A., Schwaiger, R., Gutfleisch, O., & Raabe, D. (2025). Magnetic and mechanical hardening of nano-lamellar magnets using thermo-magnetic fields. *Nature Communications* , *16*(1). https://doi.org/10.1038/s41467-025-57571-6

195. Hangen, U., & Raabe, D. (1995a). Experimental Investigation and Simulation of the Normal Conducting Properties of a Heavily Cold Rolled Cu-20 mass%Nb in Situ Composite. *Physica Status Solidi (a)*, *147*(2), 515–527. https://doi.org/10.1002/pssa.2211470222

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 22 of 87

196. Hangen, U., & Raabe, D. (1995b). Modelling of the yield strength of a heavily wire drawn Cu-20%Nb composite by use of a modified linear rule of mixtures. *Acta Metallurgica Et Materialia*, *43*(11), 4075–4082. https://doi.org/10.1016/0956-7151(95)00079-B

197. Harding, I., Mouton, I., Gault, B., Raabe, D., & Kumar, K. S. (2019). Carbon partitioning and microstructure evolution during tempering of an Fe-Ni-C steel. *Scripta Materialia*, *172*, 38–42.

198. Hariharan, A., Lu, L., Risse, J., Kostka, A., Gault, B., Jägle, E. A., & Raabe, D. (2019). Misorientation-dependent solute enrichment at interfaces and its contribution to defect formation mechanisms during laser additive manufacturing of superalloys. *Physical Review Materials*, *3*(12), 123602.

199. Hassani, M., Engels, P., Raabe, D., & Varnik, F. (2016). Localized plastic deformation in a model metallic glass: A survey of free volume and local force distributions. *Journal of Statistical Mechanics: Theory and Experiment*, *2016*(8), 84006. https://doi.org/10.1088/1742-5468/2016/08/084006

200. Haubrich, J., Gussone, J., Barriobero-Vila, P., Kürnsteiner, P., Jägle, E. A., Raabe, D., Schell, N., & Requena, G. (2019). The role of lattice defects, element partitioning and intrinsic heat effects on the microstructure in selective laser melted Ti-6Al-4V. *Acta Materialia*, *167*, 136–148. https://doi.org/10.1016/j.actamat.2019.01.039

201. He, D., Zhu, J. C., Zaefferer, S., Raabe, D., Liu, Y., Lai, Z. L., & Yang, X. W. (2012). Influences of deformation strain, strain rate and cooling rate on the Burgers orientation relationship and variants morphology during β→ α phase transformation in a near α titanium alloy. *Materials Science and Engineering: A*, *549*, 20–29. https://doi.org/10.1016/j.msea.2012.03.110

202. He, D., Zhu, J., Zaefferer, S., & Raabe, D. (2014). Effect of retained beta layer on slip transmission in Ti–6Al–2Zr–1Mo–1V near alpha titanium alloy during tensile deformation at room temperature. *Materials & Design (1980-2015)*, *56*, 937–942. https://doi.org/10.1016/j.matdes.2013.12.018

203. He, J., Zenk, C. H., Zhou, X., Neumeier, S., Raabe, D., Gault, B., & Makineni, S. K. (2020). On the atomic solute diffusional mechanisms during compressive creep deformation of a Co-Al-W-Ta single crystal superalloy. *Acta Materialia*, *184*, 86–99. https://doi.org/10.1016/j.actamat.2019.11.035

204. He, Z. F., Jia, N., Ma, D., Yan, H.-L., Li, Z. M., & Raabe, D. (2019). Joint contribution of transformation and twinning to the high strength-ductility combination of a FeMnCoCr high entropy alloy at cryogenic temperatures. *Materials Science and Engineering: A*, *759*, 437–447.

205. Helm, D., Butz, A., Raabe, D., & Gumbsch, P. (2011). Microstructure-based description of the deformation of metals: theory and application. *JOM: Journal of The Minerals, Metals & Materials Society*, *63*(4), 26–33. https://doi.org/10.1007/s11837-011-0056-8

206. Hemzalová, P., Friák, M., Šob, M., Ma, D., Udyansky, A., Raabe, D., & Neugebauer, J. (2013). Ab initio study of thermodynamic, electronic, magnetic, structural, and elastic properties of Ni 4 N allotropes. *Physical Review B*, *88*(17), 174103.

207. Herbig, M., Choi, P., & Raabe, D. (2015). Combining structural and chemical information at the nanometer scale by correlative transmission electron microscopy and atom probe tomography. *Ultramicroscopy*, *153*, 32–39. https://doi.org/10.1016/j.ultramic.2015.02.003

208. Herbig, M., Choi, P.-P. P.-P., & Raabe, D. (2013). Combining structural and chemical information on the nanometer scale by correlative TEM and APT. *Microscopy and Microanalysis*, *19*(S2), 948–949. https://doi.org/10.1017/s1431927613006739

209. Herbig, M., Kuzmina, M., Haase, C., Marceau, R. K. W., Gutierrez-Urrutia, I., Haley, D., Molodov, D. A., Choi, P., & Raabe, D. (2015). Grain boundary segregation in Fe-Mn-C twinning-induced plasticity steels studied by correlative electron backscatter diffraction and atom probe tomography. *Acta Materialia*, *83*, 37–47. https://doi.org/10.1016/j.actamat.2014.09.041

210. Herbig, M., Raabe, D., Li, Y. J., Choi, P., Zaefferer, S., & Goto, S. (2014). Atomic-scale quantification of grain boundary segregation in nanocrystalline material. *Physical Review Letters*, *112*(12), 126103. https://doi.org/10.1103/PhysRevLett.112.126103

211. Heringhaus, F., Raabe, D., & Gottstein, G. (1995). On the correlation of microstructure and electromagnetic properties of heavily cold worked Cu-20 wt% Nb wires. *Acta Metallurgica Et Materialia*, *43*(4), 1467–1476. https://doi.org/10.1016/0956-7151(94)00378-U

212. Herrera, C., Ponge, D., & Raabe, D. (2008a). Characterization of the Microstructure, Crystallographic Texture and Segregation of an As-cast Duplex Stainless Steel Slab. *Steel Research International*, *79*(6), 482–488. https://doi.org/10.1002/srin.200806156

213. Herrera, C., Ponge, D., & Raabe, D. (2011). Design of a novel Mn-based 1 GPa duplex stainless TRIP steel with 60% ductility by a reduction of austenite stability. *Acta Materialia*, *59*(11), 4653–4664. https://doi.org/10.1016/j.actamat.2011.04.011

214. Herrera, C., Ponge, D., & Raabe, D. (2008b). Microstructure and texture of hot-rolled duplex stainless steel. *3rd International Conference on Thermomechanical Processing of Steels, TMP 2008*.

215. Hickel, T., Sandlöbes, S., Marceau, R. K. W., Dick, A., Bleskov, I., Neugebauer, J., & Raabe, D. (2014). Impact of nanodiffusion on the stacking fault energy in high-strength steels. *Acta Materialia*, *75*, 147–155. https://doi.org/10.1016/j.actamat.2014.04.062

216. Hohenwarter, A., Völker, B., Kapp, M. W., Li, Y., Goto, S., Raabe, D., & Pippan, R. (2016). Ultra-strong and damage tolerant metallic bulk materials: a lesson from nanostructured pearlitic steel wires. *Scientific Reports*, *6*(1), 1–10. https://doi.org/10.1038/srep33228

217. Hölscher, M., Raabe, D., & Lücke, K. (1991a). Overview textures steels. *Steel Research*, *62*, 567–575. https://doi.org/10.1155/TSM.14-18.585

218. Hölscher, M., Raabe, D., & Lücke, K. (1991b). Rolling and recrystallization textures of bcc steels. *Steel Research-Dusseldorf-*, *62*(12), 567–575.

219. Hölscher, M., Raabe, D., & Lücke, K. (1994a). Relation and Texture.Pdf. *Acta Metallurgica*, *42*(3), 879–886.

220. Hölscher, M., Raabe, D., & Lücke, K. (1994b). Relationship between rolling textures and shear textures in f.c.c. and b.c.c. metals. *Acta Metallurgica Et Materialia*, *42*(3), 879–886. https://doi.org/10.1016/0956-7151(94)90283-6

221. Hono, K., Raabe, D., Ringer, S. P., & Seidman, D. N. (2016). Atom probe tomography of metallic nanostructures. *MRS Bulletin*, *41*(1), 23–29. https://doi.org/10.1557/mrs.2015.314

222. Huang, L., Chen, D., Xie, D., Li, S., Zhang, Y., Zhu, T., Raabe, D., Ma, E., Li, J., & Shan, Z. (2023). Quantitative tests revealing hydrogen-enhanced dislocation motion in α-iron. *Nature Materials*, *22*(6), 710–716. https://doi.org/10.1038/s41563-023-01537-w

223. Huang, L. F., Grabowski, B., Zhang, J., Lai, M. J., Tasan, C. C., Sandlöbes, S., Raabe, D., & Neugebauer, J. (2016). From electronic structure to phase diagrams: A bottom-up approach to understand the stability of titanium–transition metal alloys. *Acta Materialia*, *113*, 311–319. https://doi.org/10.1016/j.actamat.2016.04.059

224. Huh, M. Y., Lee, J. H., Park, S. H., Engler, O., & Raabe, D. (2005). Effect of through-thickness macro and micro-texture gradients on ridging of 17%Cr ferritic stainless steel sheet. *Steel Research International*, *76*(11), 797–806. https://doi.org/10.1002/srin.200506098

225. Im, H. J., Lee, S., Choi, W. S., Makineni, S. K., Raabe, D., Ko, W. S., & Choi, P. P. (2020a). Effects of Mo on the mechanical behavior of γ/γ'-strengthened Co-Ti-based alloys. *Acta Materialia*, *197*, 69–80. https://doi.org/10.1016/j.actamat.2020.07.037

226. Im, H. J., Lee, S., Choi, W. S., Makineni, S. K., Raabe, D., Ko, W.-S., & Choi, P.-P. (2020b). Effects of Mo on the mechanical behavior of γ/γ-strengthened Co-Ti-based alloys. *Acta Materialia*, *197*, 69–80.

227. Im, H. J., Makineni, S. K., Gault, B., Stein, F., Raabe, D., & Choi, P. P. (2018). Elemental partitioning and site-occupancy in γ/γ' forming Co-Ti-Mo and Co-Ti-Cr alloys. *Scripta Materialia*, *154*, 159–162. https://doi.org/10.1016/j.scriptamat.2018.05.041

228. Isik, M. I., Kostka, A., & Yardley, V. A. (2016). Microstructural stability and short-term creep properties of 12Cr-W-Mo-Co steel. *Materials Science and Engineering A*. https://doi.org/10.1016/j.msea.2014.11.024

229. Isik, M. I., Kostka, A., Yardley, V. A., Pradeep, K. G., Duarte, M. J., Choi, P. P., Raabe, D., & Eggeler, G. (2015). The nucleation of Mo-rich Laves phase particles adjacent to M23C6 micrograin boundary carbides in 12% Cr tempered

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 25 of 87

martensite ferritic steels. *Acta Materialia*, *90*, 94–104. https://doi.org/10.1016/j.actamat.2015.01.027

230. Jafari, M., Jamshidian, M., Ziaei-Rad, S., Raabe, D., & Roters, F. (2017). Constitutive modeling of strain induced grain boundary migration via coupling crystal plasticity and phase-field methods. *International Journal of Plasticity*, *99*(September), 19–42. https://doi.org/10.1016/j.ijplas.2017.08.004

231. Jägle, E. A., Choi, P. P., van Humbeeck, J., & Raabe, D. (2014). Precipitation and austenite reversion behavior of a maraging steel produced by selective laser melting. *Journal of Materials Research*, *29*(17), 2072–2079. https://doi.org/10.1557/jmr.2014.204

232. Jägle, E. A., Choi, P.-P. P., & Raabe, D. (2014). The maximum separation cluster analysis algorithm for atom-probe tomography: Parameter determination and accuracy. *Microscopy and Microanalysis*, *20*(6), 1662–1671. https://doi.org/10.1017/S1431927614013294

233. Jägle, E. A., Sheng, Z., Kürnsteiner, P., Ocylok, S., Weisheit, A., & Raabe, D. (2017). Comparison of maraging steel micro- and nanostructure produced conventionally and by laser additive manufacturing. *Materials*, *10*(1), 1–15. https://doi.org/10.3390/ma10010008

234. Jägle, E. A., Sheng, Z., Wu, L., Lu, L., Risse, J., Weisheit, A., & Raabe, D. (2016). Precipitation reactions in age-hardenable alloys during laser additive manufacturing. *Jom*, *68*(3), 943–949. https://doi.org/10.1007/s11837-015-1764-2

235. Janssens, K., Raabe, D., Nestler, B., Kozeschnik, E., & Miodownik, M. (2007). Cellular automata. *Computational Materials Engineering: An Introduction to Microstructure Evolution*, 109–150.

236. Jia, N., Eisenlohr, P., Roters, F., Raabe, D., Zhao, X., & Jia, N. (2012). Orientation dependence of shear banding in face-centered-cubic single crystals. *Acta Materialia*, *60*(8), 3415–3434. https://doi.org/10.1016/j.actamat.2012.03.005

237. Jia, N., Raabe, D., & Zhao, X. (2014). Texture and microstructure evolution during non-crystallographic shear banding in a plane strain compressed Cu-Ag metal matrix composite. *Acta Materialia*, *76*, 238–251. https://doi.org/10.1016/j.actamat.2014.05.036

238. Jia, N., Raabe, D., & Zhao, X. (2016). Crystal plasticity modeling of size effects in rolled multilayered Cu-Nb composites. *Acta Materialia*, *111*, 116–128. https://doi.org/10.1016/j.actamat.2016.03.055

239. Jia, N., Roters, F., Eisenlohr, P., Kords, C., & Raabe, D. (2012). Non-crystallographic shear banding in crystal plasticity FEM simulations: Example of texture evolution in α-brass. *Acta Materialia*, *60*(3), 1099–1115. https://doi.org/10.1016/j.actamat.2011.10.047

240. Jia, N., Roters, F., Eisenlohr, P., Raabe, D., & Zhao, X. (2013). Simulation of shear banding in heterophase co-deformation: Example of plane strain compressed Cu-Ag and Cu-Nb metal matrix composites. *Acta Materialia*, *61*(12), 4591–4606. https://doi.org/10.1016/j.actamat.2013.04.029

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 26 of 87

241. Jiang, S., Wang, H., Wu, Y., Liu, X., Chen, H., Yao, M., Gault, B., Ponge, D., Raabe, D., Hirata, A., Chen, M., Wang, Y., & Lu, Z. (2017). Ultrastrong steel via minimal lattice misfit and high-density nanoprecipitation. *Nature*, *544*(7651), 460–464. https://doi.org/10.1038/nature22032

242. Joseph, S., Kontis, P., Chang, Y., Shi, Y., Raabe, D., Gault, B., & Dye, D. (2022). A cracking oxygen story: A new view of stress corrosion cracking in titanium alloys. *Acta Materialia*, *227*. https://doi.org/10.1016/j.actamat.2022.117687

243. Jovičević-Klug, M., Ma, Y., Jovičević-Klug, P., Prabhakar, J. M., Rohwerder, M., & Raabe, D. (2024). Thermal Kinetics and Nitriding Effect of Ammonia-Based Direct Reduction of Iron Oxides. *ACS Sustainable Chemistry & Engineering*, *12*, 9882−9896. https://pubs.acs.org/doi/10.1021/acssuschemeng.4c02363

244. Juntunen, P., Karjalainen, P., Raabe, D., Bolle, G., & Kopio, T. (2001). Optimizing continuous annealing of interstitial-free steels for improving deep drawability. *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, *32*(8), 1989–1995. https://doi.org/10.1007/s11661-001-0011-3

245. Kadkhodapour, J., Schmauder, S., Raabe, D., Ziaei-Rad, S., Weber, U., & Calcagnotto, M. (2011). Experimental and numerical study on geometrically necessary dislocations and non-homogeneous mechanical properties of the ferrite phase in dual phase steels. *Acta Materialia*, *59*(11), 4387–4394. https://doi.org/10.1016/j.actamat.2011.03.062

246. Kapoor, R., Sarkar, A., Singh, J., Samajdar, I., & Raabe, D. (2014). Effect of strain rate on twinning in a Zr alloy. *Scripta Materialia*, *74*, 72–75. https://doi.org/10.1016/j.scriptamat.2013.10.025

247. Kasian, O., Geiger, S., Li, T., Grote, J.-P., Schweinar, K., Zhang, S., Scheu, C., Raabe, D., Cherevko, S., & Gault, B. (2019). Degradation of iridium oxides via oxygen evolution from the lattice: correlating atomic scale structure with reaction mechanisms. *Energy & Environmental Science*, *12*(12), 3548–3555.

248. Katnagallu, S., Dagan, M., Parviainen, S., Nematollahi, A., Grabowski, B., Bagot, P. A. J. J., Rolland, N., Neugebauer, J., Raabe, D., Vurpillot, F., Moody, M. P., & Gault, B. (2018). Impact of local electrostatic field rearrangement on field ionization. *Journal of Physics D: Applied Physics*, *51*(10), 105601. https://doi.org/10.1088/1361-6463/aaaba6

249. Katnagallu, S., Gault, B., Grabowski, B., Neugebauer, J., Raabe, D., & Nematollahi, A. (2018). Advanced data mining in field ion microscopy. *Materials Characterization*, *146*, 307–318. https://doi.org/10.1016/j.matchar.2018.02.040

250. Katnagallu, S., Nematollahi, A., Dagan, M., Moody, M., Grabowski, B., Gault, B., Raabe, D., & Neugebauer, J. (2017). High Fidelity Reconstruction of Experimental Field Ion Microscopy Data by Atomic Relaxation Simulations. *Microscopy and Microanalysis*, *23*(S1), 642–643. https://doi.org/10.1017/s1431927617003877

251. Katnagallu, S., Wu, G., Singh, S. P., Nandam, S. H., Xia, W., Stephenson, L. T., Gleiter, H., Schwaiger, R., Hahn, H., & Herbig, M. (2020). Nanoglass–

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 27 of 87

Nanocrystal Composite—a Novel Material Class for Enhanced Strength–Plasticity Synergy. *Small*, *16*(39), 2004400.

252. Keerthika, B., Cao, Y. P., & Raabe, D. (2009). Mechanical characterization of viscoelastic-plastic soft matter using spherical indentation. *Cmc-Computers Materials & Continua*, *10*(3), 243–258.

253. Khanchandani, H., El-Zoka, A. A., Kim, S. H., Tezins, U., Vogel, D., Sturm, A., Raabe, D., Gault, B., & Stephenson, L. T. (2022). Laser-equipped gas reaction chamber for probing environmentally sensitive materials at near atomic scale. *PLoS ONE*, *17*(2 February), e0262543. https://doi.org/10.1371/journal.pone.0262543

254. Khorashadizadeh, A., Raabe, D., Winning, M., & Pippan, R. (2011). Recrystallization and Grain Growth in Ultrafine-Grained Materials Produced by High Pressure Torsion. *Advanced Engineering Materials*, *13*(4), 245–250. https://doi.org/10.1002/adem.201000253

255. Khorashadizadeh, A., Raabe, D., Zaefferer, S., Rohrer, G. S., Rollett, A. D., & Winning, M. (2011). Five-parameter grain boundary analysis by 3D EBSD of an ultra fine grained CuZr alloy processed by equal channel angular pressing. *Advanced Engineering Materials*, *13*(4), 237–244. https://doi.org/10.1002/adem.201000259

256. Khorrami, M. S., Mianroodi, J. R., Siboni, N. H., Goyal, P., Svendsen, B., Benner, P., & Raabe, D. (2023). An artificial neural network for surrogate modeling of stress fields in viscoplastic polycrystalline materials. *Npj Computational Materials*, *9*(1). https://doi.org/10.1038/s41524-023-00991-z

257. Kim, J. K., Guo, W., Choi, P. P., & Raabe, D. (2018). Compositional evolution of long-period stacking ordered structures in magnesium studied by atom probe tomography. *Scripta Materialia*, *156*, 55–59. https://doi.org/10.1016/j.scriptamat.2018.07.017

258. Kim, J. K., Jin, L., Sandlöbes, S., & Raabe, D. (2017). Diffusional-displacive transformation enables formation of long-period stacking order in magnesium. *Scientific Reports*, *7*(1), 1–8. https://doi.org/10.1038/s41598-017-04343-y

259. Kim, J. K., Sandlöbes, S., & Raabe, D. (2015). On the room temperature deformation mechanisms of a Mg-Y-Zn alloy with long-period-stacking-ordered structures. *Acta Materialia*, *82*, 414–423. https://doi.org/10.1016/j.actamat.2014.09.036

260. Kim, J., Oh, H. S., Kim, W., Choi, P.-P. P., Raabe, D., & Park, E. S. (2017). Modulation of plastic flow in metallic glasses via nanoscale networks of chemical heterogeneities. *Acta Materialia*, *140*, 116–129. https://doi.org/10.1016/j.actamat.2017.08.002

261. Kim, J.-H. H., Kim, B. K., Kim, D.-I. I., Choi, P.-P. P., Raabe, D., & Yi, K.-W. W. (2015). The role of grain boundaries in the initial oxidation behavior of austenitic stainless steel containing alloyed Cu at 700 C for advanced thermal power plant applications. *Corrosion Science*, *96*, 52–66. https://doi.org/10.1016/j.corsci.2015.03.014

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 28 of 87

262. Kim, J.-K. K., Ko, W.-S. S., Sandlöbes, S., Heidelmann, M., Grabowski, B., & Raabe, D. (2016). The role of metastable LPSO building block clusters in phase transformations of an Mg-Y-Zn alloy. *Acta Materialia*, *112*, 171–183. https://doi.org/10.1016/j.actamat.2016.04.016

263. Kim, S. H., Zhang, X., Ma, Y., Souza Filho, I. R., Schweinar, K., Angenendt, K., Vogel, D., Stephenson, L. T., El-Zoka, A. A., Mianroodi, J. R., Rohwerder, M., Gault, B., & Raabe, D. (2021). Influence of microstructure and atomic-scale chemistry on the direct reduction of iron ore with hydrogen at 700°C. *Acta Materialia*, *212*, 116933. https://doi.org/10.1016/j.actamat.2021.116933

264. Kim, S.-H., Antonov, S., Zhou, X., Stephenson, L. T., Jung, C., El-Zoka, A. A., Schreiber, D. K., Conroy, M., & Gault, B. (2022). Atom probe analysis of electrode materials for Li-ion batteries: challenges and ways forward. *Journal of Materials Chemistry A*, *10*(9), 4926–4935. https://doi.org/10.1039/d1ta10050e

265. Kini, A. R., Maischner, D., Weisheit, A., Ponge, D., Gault, B., Jägle, E. A., & Raabe, D. (2020). In-situ synthesis via laser metal deposition of a lean Cu–3.4 Cr–0.6 Nb (at%) conductive alloy hardened by Cr nano-scale precipitates and by Laves phase micro-particles. *Acta Materialia*, *197*, 330–340.

266. Kishida, K., Okutani, M., Suzuki, H., Inui, H., Heilmaier, M., & Raabe, D. (2023). Room-temperature deformation of single crystals of the sigma-phase compound FeCr with the tetragonal D8b structure investigated by micropillar compression. *Acta Materialia*, *249*(February), 118829. https://doi.org/10.1016/j.actamat.2023.118829

267. Klinkenberg, C., Raabe, D., & Lticke, K. (1992). cementite on the cold-rolling textures of low-carbon steel. *Steel Research*, *63*(6).

268. Klinkenberg, C., Raabe, D., & Lücke, K. (1992). Effects of volume fraction and dispersion rate of grain boundary cementite on the recrystallization textures of low carbon steel. *Scripta Metallurgica et Materiala*, *26*(7), 1137–1141. https://doi.org/10.1016/0956-716X(92)90243-8

269. Klinkenberg, C., Raabe, D., & Lucke, K. (1992). Influence of volume fraction and dispersion rate of grain-boundary cementite on the cold-rolling textures of low-carbon steel. *Steel Research*, *63*(6), 263–269. https://doi.org/10.1002/srin.199200512

270. Klinkenberg, C., Raabe, D., & Lucke, K. (1993). Influence of intercritical annealing on the texture formation in low-carbon steel strips. *Steel Research(Germany)*, *64*(5), 262–266.

271. Klinkenberg, C., Raabe, D., & Lücke, K. (1994). Modelling of the anisotropy of Young's modulus in polycrystals. *Steel Research*, *65*(7), 291–297.

272. Kobayashi, S., Schneider, A., Zaefferer, S., Frommeyer, G., & Raabe, D. (2005). Phase equilibria among α-Fe (Al, Cr, Ti), liquid and TiC and the formation of TiC in Fe3Al-based alloys. *Acta Materialia*, *53*(14), 3961–3970. https://doi.org/10.1016/j.actamat.2005.04.044

273. Kobayashi, S., Zaefferer, S., Schneider, A., Raabe, D., & Frommeyer, G. (2004). Slip system determination by rolling texture measurements around the strength

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 29 of 87

peak temperature in a Fe3Al-based alloy. *Materials Science and Engineering A*, *387–389*(1-2 SPEC. ISS.), 950–954. https://doi.org/10.1016/j.msea.2004.02.086

274. Kobayashi, S., Zaefferer, S., Schneider, A., Raabe, D., & Frommeyer, G. (2005). Optimisation of precipitation for controlling recrystallisation of wrought Fe3Al based alloys. *Intermetallics*, *13*(12), 1296–1303. https://doi.org/10.1016/j.intermet.2004.10.016

275. Kobayashi, S., Zambaldi, C., & Raabe, D. (2010). Orientation dependence of local lattice rotations at precipitates: Example of κ-Fe3AlC carbides in a Fe3Al-based alloy. *Acta Materialia*, *58*(20), 6672–6684. https://doi.org/10.1016/j.actamat.2010.08.030

276. Kolb, M., Freund, L. P., Fischer, F., Povstugar, I., Makineni, S. K., Gault, B., Raabe, D., Müller, J., Spiecker, E., Neumeier, S., & Göken, M. (2018). On the grain boundary strengthening effect of boron in γ/γ' Cobalt-base superalloys. *Acta Materialia*, *145*, 247–254. https://doi.org/10.1016/j.actamat.2017.12.020

277. Kolb, M., Zenk, C. H., Kirzinger, A., Povstugar, I., Raabe, D., Neumeier, S., & Göken, M. (2017). Influence of rhenium on γ'-strengthened cobalt-base superalloys. *Journal of Materials Research*, *32*(13), 2551–2559.

278. Konijnenberg, P. J., Zaefferer, S., & Raabe, D. (2015). Assessment of geometrically necessary dislocation levels derived by 3D EBSD. *Acta Materialia*, *99*, 402–414. https://doi.org/10.1016/j.actamat.2015.06.051

279. Konijnenberg, P., Khorashadizadeh, A., Zaefferer, S., & Raabe, D. (2013). Analysis of 3D-EBSD Datasets Obtained by FIB Tomography. *Microscopy and Microanalysis*, *19*(S2), 846–847.

280. Konrad, J., Zaefferer, S., & Raabe, D. (2006). Investigation of orientation gradients around a hard Laves particle in a warm-rolled Fe3Al-based alloy using a 3D EBSD-FIB technique. *Acta Materialia*, *54*(5), 1369–1380. https://doi.org/10.1016/j.actamat.2005.11.015

281. Konrad, J., Zaefferer, S., Schneider, A., Raabe, D., & Frommeyer, G. (2005). Hot deformation behavior of a Fe3Al-binary alloy in the A2 and B2-order regimes. *Intermetallics*, *13*(12), 1304–1312. https://doi.org/10.1016/j.intermet.2004.10.017

282. Kontis, P., Chauvet, E., Peng, Z., He, J., da Silva, A. K., Raabe, D., Tassin, C., Blandin, J.-J., Abed, S., Dendievel, R., Gault, B., & Martin, G. (2019). Atomic-scale grain boundary engineering to overcome hot-cracking in additively-manufactured superalloys. *Acta Materialia*, *177*, 209–221. https://doi.org/10.1016/j.actamat.2019.07.041

283. Kontis, P., Collins, D. M., Wilkinson, A. J., Reed, R. C., Raabe, D., & Gault, B. (2018). Microstructural degradation of polycrystalline superalloys from oxidized carbides and implications on crack initiation. *Scripta Materialia*, *147*, 59–63. https://doi.org/10.1016/j.scriptamat.2017.12.028

284. Kontis, P., Köhler, M., Evertz, S., Chen, Y.-T. T., Schnabel, V., Soler, R., Bednarick, J., Kirchlechner, C., Dehm, G., Raabe, D., Schneider, J. M., & Gault, B. (2018). Nano-laminated thin film metallic glass design for outstanding mechanical

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 30 of 87

properties. *Scripta Materialia*, *155*, 73–77. https://doi.org/10.1016/j.scriptamat.2018.06.015

285. Kontis, P., Kostka, A., Raabe, D., & Gault, B. (2019). Influence of composition and precipitation evolution on damage at grain boundaries in a crept polycrystalline Ni-based superalloy. *Acta Materialia*, *166*, 158–167. https://doi.org/10.1016/j.actamat.2018.12.039

286. Kontis, P., Li, Z., Collins, D. M., Cormier, J., Raabe, D., & Gault, B. (2018). The effect of chromium and cobalt segregation at dislocations on nickel-based superalloys. *Scripta Materialia*, *145*, 76–80. https://doi.org/10.1016/j.scriptamat.2017.10.005

287. Kontis, P., Li, Z., Segersäll, M., Moverare, J. J., Reed, R. C., Raabe, D., & Gault, B. (2018). The role of oxidized carbides on thermal-mechanical performance of polycrystalline superalloys. *Metallurgical and Materials Transactions A*, *49*(9), 4236–4245. https://doi.org/10.1007/s11661-018-4709-x

288. Koprek, A., Cojocaru-Miredin, O., Wuerz, R., Freysoldt, C., Gault, B., & Raabe, D. (2016). Cd and impurity redistribution at the CdS/CIGS interface after annealing of CIGS-based solar cells resolved by atom probe tomography. *IEEE Journal of Photovoltaics*, *7*(1), 313–321. https://doi.org/10.1109/JPHOTOV.2016.2629841

289. Koprek, A., Cojocaru-Mirédin, O., Wuerz, R., Freysoldt, C., & Raabe, D. (2015). Cd and impurity redistribution at the pn junction of CIGS based solar cells resolved by atom-probe tomography. *2015 IEEE 42nd Photovoltaic Specialist Conference (PVSC)*, 1–6.

290. Körmann, F., Li, Z., Raabe, D., & Sluiter, M. H. F. (2021). Iron-rich High Entropy Alloys. In *High-Performance Ferrous Alloys* (pp. 389–421). Springer.

291. Korte-Kerzel, S., Hickel, T., Huber, L., Raabe, D., Sandlöbes-Haut, S., Todorova, M., & Neugebauer, J. (2022). Defect phases–thermodynamics and impact on material properties. *International Materials Reviews*, *67*(1), 89–117. https://doi.org/10.1080/09506608.2021.1930734

292. Kovács, A., Pradeep, K. G., Herzer, G., Raabe, D., & Dunin-Borkowski, R. E. (2016). Magnetic microstructure in a stress-annealed Fe73. 5Si15. 5B7Nb3Cu1 soft magnetic alloy observed using off-axis electron holography and Lorentz microscopy. *Aip Advances*, *6*(5), 56501.

293. Koyama, M., Akiyama, E., Lee, Y. K., Raabe, D., & Tsuzaki, K. (2017). Overview of hydrogen embrittlement in high-Mn steels. *International Journal of Hydrogen Energy*, *42*(17), 12706–12723. https://doi.org/10.1016/j.ijhydene.2017.02.214

294. Koyama, M., Akiyama, E., Sawaguchi, T., Raabe, D., & Tsuzaki, K. (2012). Hydrogen-induced cracking at grain and twin boundaries in an Fe-Mn-C austenitic steel. *Scripta Materialia*, *66*(7), 459–462. https://doi.org/10.1016/j.scriptamat.2011.12.015

295. Koyama, M., Akiyama, E., Tsuzaki, K., & Raabe, D. (2013). Hydrogen-assisted failure in a twinning-induced plasticity steel studied under in situ hydrogen charging by electron channeling contrast imaging. *Acta Materialia*, *61*(12), 4607–4618. https://doi.org/10.1016/j.actamat.2013.04.030

296. Koyama, M., Bashir, A., Rohwerder, M., Merzlikin, S. v., Akiyama, E., Tsuzaki, K., & Raabe, D. (2015). Spatially and kinetically resolved mapping of hydrogen in a twinning-induced plasticity steel by use of Scanning Kelvin Probe Force Microscopy. *Journal of the Electrochemical Society*, *162*(12), C638–C647. https://doi.org/10.1149/2.0131512jes

297. Koyama, M., Rohwerder, M., Tasan, C. C., Bashir, A., Akiyama, E., Takai, K., Raabe, D., & Tsuzaki, K. (2017). Recent progress in microstructural hydrogen mapping in steels: quantification, kinetic analysis, and multi-scale characterisation. *Materials Science and Technology (United Kingdom)*, *33*(13), 1481–1496. https://doi.org/10.1080/02670836.2017.1299276

298. Koyama, M., Springer, H., Merzlikin, S. v., Tsuzaki, K., Akiyama, E., & Raabe, D. (2014). Hydrogen embrittlement associated with strain localization in a precipitation-hardened Fe-Mn-Al-C light weight austenitic steel. *International Journal of Hydrogen Energy*, *39*(9), 4634–4646. https://doi.org/10.1016/j.ijhydene.2013.12.171

299. Koyama, M., Tasan, C. C., Akiyama, E., Tsuzaki, K., & Raabe, D. (2014). Hydrogen-assisted decohesion and localized plasticity in dual-phase steel. *Acta Materialia*, *70*, 174–187. https://doi.org/10.1016/j.actamat.2014.01.048

300. Koyama, M., Tasan, C. C., Nagashima, T., Akiyama, E., Raabe, D., & Tsuzaki, K. (2016). Hydrogen-assisted damage in austenite/martensite dual-phase steel. *Philosophical Magazine Letters*, *96*(1), 9–18. https://doi.org/10.1080/09500839.2015.1130275

301. Koyama, M., Zhang, Z., Wang, M., Ponge, D., Raabe, D., Tsuzaki, K., Noguchi, H., & Tasan, C. C. (2017). Bone-like crack resistance in hierarchical metastable nanolaminate steels. *Science*, *355*(6329), 1055–1057. https://doi.org/10.1126/science.aal2766

302. Kraska, M., Doig, M., Tikhomirov, D., Raabe, D., & Roters, F. (2009). Virtual material testing for stamping simulations based on polycrystal plasticity. *Computational Materials Science*, *46*(2), 383–392. https://doi.org/10.1016/j.commatsci.2009.03.025

303. Krause, F. F., Ahl, J.-P. P., Tytko, D., Choi, P.-P. P., Egoavil, R., Schowalter, M., Mehrtens, T., Müller-Caspary, K., Verbeeck, J., Raabe, D., Hertkorn, J., Engl, K., & Rosenauer, A. (2015). Homogeneity and composition of AlInGaN: A multiprobe nanostructure study. *Ultramicroscopy*, *156*(2015), 29–36. https://doi.org/10.1016/j.ultramic.2015.04.012

304. Kresse, T., Li, Y. J., Boll, T., Borchers, C., Choi, P., Al-Kassab, T., Raabe, D., & Kirchheim, R. (2013). Influence of supersaturated carbon on the diffusion of Ni in ferrite determined by atom probe tomography. *Scripta Materialia*, *69*(5), 424–427. https://doi.org/10.1016/j.scriptamat.2013.05.039

305. Krüger, T., Gross, M., Raabe, D., & Varnik, F. (2013). Crossover from tumbling to tank-treading-like motion in dense simulated suspensions of red blood cells. *Soft Matter*, *9*(37), 9008–9015.

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 32 of 87

306. Krüger, T., Varnik, F., & Raabe, D. (2009). Shear stress in lattice Boltzmann simulations. *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, *79*(4), 1–14. https://doi.org/10.1103/PhysRevE.79.046704

307. Krüger, T., Varnik, F., & Raabe, D. (2010). Second-order convergence of the deviatoric stress tensor in the standard Bhatnagar-Gross-Krook lattice Boltzmann method. *Physical Review E*, *82*(2), 25701. https://doi.org/10.1103/PhysRevE.82.025701

308. Krüger, T., Varnik, F., & Raabe, D. (2011a). Efficient and accurate simulations of deformable particles immersed in a fluid using a combined immersed boundary lattice Boltzmann finite element method. *Computers and Mathematics with Applications*, *61*(12), 3485–3505. https://doi.org/10.1016/j.camwa.2010.03.057

309. Krüger, T., Varnik, F., & Raabe, D. (2011b). Particle stress in suspensions of soft objects. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *369*(1945), 2414–2421. https://doi.org/10.1098/rsta.2011.0090

310. Krywka, C., Sternemann, C., Paulus, M., Javid, N., Winter, R., Al-Sawalmih, A., Yi, S., Raabe, D., & Tolan, M. (2007). The small-angle and wide-angle X-ray scattering set-up at beamline BL9 of DELTA. *Journal of Synchrotron Radiation*, *14*(3), 244–251. https://doi.org/10.1107/S0909049507009727

311. Kumar, D., Bieler, T. R., Eisenlohr, P., Mason, D. E., Crimp, M. A., Roters, F., & Raabe, D. (2008). On predicting nucleation of microcracks due to slip-twin interactions at grain boundaries in duplex Near gamma-TiAl. *Journal Of Engineering Materials And Technology-Transactions Of The Asme*, *130*(2), 0210121–02101212. https://doi.org/10.1115/1.2841620

312. Kundin, J., Raabe, D., & Emmerich, H. (2011). A phase-field model for incoherent martensitic transformations including plastic accommodation processes in the austenite. *Journal of the Mechanics and Physics of Solids*, *59*(10), 2082–2102. https://doi.org/10.1016/j.jmps.2011.07.001

313. Kuo, J.-C. C., Zaefferer, S., Zhao, Z., Winning, M., & Raabe, D. (2003). Deformation behavior of aluminum bicrystals. *Advanced Engineering Materials*, *5*(8), 563–566. https://doi.org/10.1002/adem.200300372

314. Kürnsteiner, P., Bajaj, P., Gupta, A., Wilms, M. B., Weisheit, A., Li, X., Leinenbach, C., Gault, B., Jägle, E. A., & Raabe, D. (2020). Control of thermally stable core-shell nano-precipitates in additively manufactured Al-Sc-Zr alloys. *Additive Manufacturing*, *32*. https://doi.org/10.1016/j.addma.2019.100910

315. Kürnsteiner, P., Hariharan, A., Jung, H. Y., Peter, N., Wilms, M. B., Weisheit, A., Barriobero-Vila, P., Gault, B., Raabe, D., & Jägle, E. A. (2019). Application of Atom Probe Tomography to Complex Microstructures of Laser Additively Manufactured Samples. *Microscopy and Microanalysis*, *25*(S2), 2514–2515. https://doi.org/10.1017/s1431927619013308

316. Kürnsteiner, P., Wilms, M. B., Weisheit, A., Barriobero-Vila, P., Gault, B., Jägle, E. A., & Raabe, D. (2017). In-process Precipitation During Laser Additive

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 33 of 87

Manufacturing Investigated by Atom Probe Tomography. *Microscopy and Microanalysis*, *23*(S1), 694–695. https://doi.org/10.1017/s1431927617004135

317. Kürnsteiner, P., Wilms, M. B., Weisheit, A., Barriobero-Vila, P., Jägle, E. A., & Raabe, D. (2017). Massive nanoprecipitation in an Fe-19Ni-xAl maraging steel triggered by the intrinsic heat treatment during laser metal deposition. *Acta Materialia*, *129*, 52–60. https://doi.org/10.1016/j.actamat.2017.02.069

318. Kürnsteiner, P., Wilms, M. B., Weisheit, A., Gault, B., Jägle, E. A., & Raabe, D. (2020). High-strength Damascus steel by additive manufacturing. *Nature*, *582*(7813), 515–519. https://doi.org/10.1038/s41586-020-2409-3

319. Kuzmina, M., Herbig, M., Ponge, D., Sandlöbes, S., & Raabe, D. (2015). Linear complexions: Confined chemical and structural states at dislocations. *Science*, *349*(6252), 1080–1083. https://doi.org/10.1126/science.aab2633

320. Kuzmina, M., Ponge, D., & Raabe, D. (2015). Grain boundary segregation engineering and austenite reversion turn embrittlement into toughness: Example of a 9 wt.% medium Mn steel. *Acta Materialia*, *86*, 182–192. https://doi.org/10.1016/j.actamat.2014.12.021

321. Kwiatkowski da Silva, A., Inden, G., Kumar, A., Ponge, D., Gault, B., & Raabe, D. (2018). Competition between formation of carbides and reversed austenite during tempering of a medium-manganese steel studied by thermodynamic-kinetic simulations and atom probe tomography. *Acta Materialia*, *147*, 165–175. https://doi.org/10.1016/j.actamat.2018.01.022

322. Kwiatkowski da Silva, A., Kamachali, R. D., Ponge, D., Gault, B., Neugebauer, J., & Raabe, D. (2019). Thermodynamics of grain boundary segregation, interfacial spinodal and their relevance for nucleation during solid-solid phase transitions. *Acta Materialia*, *168*, 109–120. https://doi.org/10.1016/j.actamat.2019.02.005

323. Kwiatkowski da Silva, A., Leyson, G., Kuzmina, M., Ponge, D., Herbig, M., Sandlöbes, S., Gault, B., Neugebauer, J., & Raabe, D. (2017). Confined chemical and structural states at dislocations in Fe-9wt%Mn steels: A correlative TEM-atom probe study combined with multiscale modelling. *Acta Materialia*, *124*, 305–315. https://doi.org/10.1016/j.actamat.2016.11.013

324. Kwiatkowski Da Silva, A., Ponge, D., Peng, Z., Inden, G., Lu, Y., Breen, A., Gault, B., & Raabe, D. (2018). Phase nucleation through confined spinodal fluctuations at crystal defects evidenced in Fe-Mn alloys. *Nature Communications*, *9*(1), 1–11. https://doi.org/10.1038/s41467-018-03591-4

325. Lai, M. J., Li, T., & Raabe, D. (2018). ω phase acts as a switch between dislocation channeling and joint twinning-and transformation-induced plasticity in a metastable β titanium alloy. *Acta Materialia*, *151*, 67–77. https://doi.org/10.1016/j.actamat.2018.03.053

326. Lai, M. J., Li, Y. J., Lillpopp, L., Ponge, D., Will, S., & Raabe, D. (2018). On the origin of the improvement of shape memory effect by precipitating VC in Fe–Mn–Si-based shape memory alloys. *Acta Materialia*, *155*, 222–235. https://doi.org/10.1016/j.actamat.2018.06.008

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 34 of 87

327. Lai, M. J., Tasan, C. C., & Raabe, D. (2015). Deformation mechanism of ω-enriched Ti-Nb-based gum metal: Dislocation channeling and deformation induced ω-β transformation. *Acta Materialia*, *100*, 290–300. https://doi.org/10.1016/j.actamat.2015.08.047

328. Lai, M. J., Tasan, C. C., & Raabe, D. (2016). On the mechanism of {332} twinning in metastable β titanium alloys. *Acta Materialia*, *111*, 173–186. https://doi.org/10.1016/j.actamat.2016.03.040

329. Lai, M. J., Tasan, C. C., Zhang, J., Grabowski, B., Huang, L. F., & Raabe, D. (2015). Origin of shear induced β to ω transition in Ti-Nb-based alloys. *Acta Materialia*, *92*, 55–63. https://doi.org/10.1016/j.actamat.2015.03.040

330. Lapauw, T., Tytko, D., Vanmeensel, K., Huang, S., Choi, P.-P., Raabe, D., Caspi, E. N., Ozeri, O., To Baben, M., & Schneider, J. M. (2016). (Nb x, Zr1–x) 4AlC3 MAX Phase Solid Solutions: Processing, Mechanical Properties, and Density Functional Theory Calculations. *Inorganic Chemistry*, *55*(11), 5445–5452.

331. Laplanche, G., Kostka, A., Horst, O. M., Eggeler, G., & George, E. P. (2016). Microstructure evolution and critical stress for twinning in the CrMnFeCoNi high-entropy alloy. *Acta Materialia*, *118*, 152–163. https://doi.org/10.1016/j.actamat.2016.07.038

332. Lee, D.-H., Sun, B., Lee, S., Ponge, D., Jägle, E. A., & Raabe, D. (2021). Comparative study of hydrogen embrittlement resistance between additively and conventionally manufactured 304L austenitic stainless steels. *Materials Science and Engineering: A*, *803*, 140499.

333. Lei, Z., Liu, X., Wu, Y. Y., Wang, H. H., Jiang, S., Wang, S., Hui, X., Wu, Y. Y., Gault, B., Kontis, P., Raabe, D., Gu, L., Zhang, Q., Chen, H., Wang, H. H., Liu, J., An, K., Zeng, Q., Nieh, T. G., … Z. Lei Y. Wu, H. Wang, S. Jiang, S. Wang, X. Hui, Y. Wu, B. Gault, P. Kontis, D. Raabe, L. Gu, Q. Zhang, H. Chen, H. Wang, J. Liu, K. An, Q. Zeng, T. Nieh, Z. Lu, X. L. (2018). Enhanced strength and ductility in a high-entropy alloy via ordered oxygen complexes. *Nature*, *563*(7732), 546–550. https://doi.org/10.1038/s41586-018-0685-y

334. Lei, Z., Wu, Y., He, J., Liu, X., Wang, H., Jiang, S., Gu, L., Zhang, Q., Gault, B., Raabe, D., & Lu, Z. (2020). Snoek-type damping performance in strong and ductile high-entropy alloys. *Science Advances*, *6*(25), eaba7802. https://doi.org/10.1126/sciadv.aba7802

335. Lemmens, B., Springer, H., de Graeve, I., de Strycker, J., Raabe, D., & Verbeken, K. (2017a). Effect of silicon on the microstructure and growth kinetics of intermetallic phases formed during hot-dip aluminizing of ferritic steel. *Surface and Coatings Technology*, *319*, 104–109. https://doi.org/10.1016/j.surfcoat.2017.03.040

336. Lemmens, B., Springer, H., de Graeve, I., de Strycker, J., Raabe, D., & Verbeken, K. (2017b). Phases formed during hot-dip aluminizing of ferritic steel. *Surface & Coatings Technology*, *319*, 104–109.

337. Lemmens, B., Springer, H., Duarte, M. J., de Graeve, I., de Strycker, J., Raabe, D., & Verbeken, K. (2016). Atom probe tomography of intermetallic phases and

interfaces formed in dissimilar joining between Al alloys and steel. *Materials Characterization*, *120*, 268–272. https://doi.org/10.1016/j.matchar.2016.09.008

338. Lemmens, B., Springer, H., Peeters, M., de Graeve, I., de Strycker, J., Raabe, D., & Verbeken, K. (2018). Deformation induced degradation of hot-dip aluminized steel. *Materials Science and Engineering: A*, *710*(July 2017), 385–391. https://doi.org/10.1016/j.msea.2017.10.094

339. Li, F., Barani, A. A., Ponge, D., & Raabe, D. (2006). Austenite Grain Coarsening Behaviour in a Medium Carbon Si-Cr Spring Steel with and without Vanadium. *Steel Research International*, *77*(8), 590–594. https://doi.org/10.1002/srin.200606434

340. Li, J., Lu, W., Gibson, J., Zhang, S., Chen, T., Korte-Kerzel, S., & Raabe, D. (2018). Eliminating deformation incompatibility in composites by gradient nanolayer architectures. *Scientific Reports*, *8*(1), 1–9. https://doi.org/10.1038/s41598-018-34369-9

341. Li, J., Lu, W., Gibson, J., Zhang, S., Korte-Kerzel, S., & Raabe, D. (2020). Compatible deformation and extra strengthening by heterogeneous nanolayer composites. *Scripta Materialia*, *179*, 30–35.

342. Li, J., Lu, W., Zhang, S., & Raabe, D. (2017). Large strain synergetic material deformation enabled by hybrid nanolayer architectures. *Scientific Reports*, *7*(1), 1–10. https://doi.org/10.1038/s41598-017-11001-w

343. Li, L., Li, Z., Kwiatkowski da Silva, A., Peng, Z., Zhao, H., Gault, B., & Raabe, D. (2019). Segregation-driven grain boundary spinodal decomposition as a pathway for phase nucleation in a high-entropy alloy. *Acta Materialia*, *178*, 1–9. https://doi.org/10.1016/j.actamat.2019.07.052

344. Li, Q., Yan, F. K., Tao, N. R., Ponge, D., Raabe, D., & Lu, K. (2019). Deformation compatibility between nanotwinned and recrystallized grains enhances resistance to interface cracking in cyclic loaded stainless steel. *Acta Materialia*, *165*, 87–98. https://doi.org/10.1016/j.actamat.2018.11.033

345. Li, T., Kasian, O., Cherevko, S., Zhang, S., Geiger, S., Scheu, C., Felfer, P., Raabe, D., Gault, B., & Mayrhofer, K. J. J. J. J. (2018). Atomic-scale insights into surface species of electrocatalysts in three dimensions. *Nature Catalysis*, *1*(4), 300–305. https://doi.org/10.1038/s41929-018-0043-3

346. Li, Y. J., Choi, P., Borchers, C., Westerkamp, S., Goto, S., Raabe, D., & Kirchheim, R. (2011). Atomic-scale mechanisms of deformation-induced cementite decomposition in pearlite. *Acta Materialia*, *59*(10), 3965–3977. https://doi.org/10.1016/j.actamat.2011.03.022

347. Li, Y. J., Choi, P., Goto, S., Borchers, C., Raabe, D., & Kirchheim, R. (2012). Evolution of strength and microstructure during annealing of heavily cold-drawn 6.3 GPa hypereutectoid pearlitic steel wire. *Acta Materialia*, *60*(9), 4005–4016. https://doi.org/10.1016/j.actamat.2012.03.006

348. Li, Y. J., Choi, P., Goto, S., Borchers, C., Raabe, D., & Kirchheim, R. (2013). Atomic scale investigation of redistribution of alloying elements in pearlitic steel wires

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 36 of 87

upon cold-drawing and annealing. *Ultramicroscopy*, *132*, 233–238. https://doi.org/10.1016/j.ultramic.2012.10.010

349. Li, Y. J., Herbig, M., Goto, S., & Raabe, D. (2016). Formation of nanosized grain structure in martensitic 100Cr6 bearing steels upon rolling contact loading studied by atom probe tomography. *Materials Science and Technology*, *32*(11), 1100–1105. https://doi.org/10.1080/02670836.2015.1120458

350. Li, Y. J., Herbig, M., Goto, S., & Raabe, D. (2017). Atomic scale characterization of white etching area and its adjacent matrix in a martensitic 100Cr6 bearing steel. *Materials Characterization*, *123*, 349–353. https://doi.org/10.1016/j.matchar.2016.12.002

351. Li, Y. J. J., Kostka, A., Choi, P., Goto, S., Ponge, D., Kirchheim, R., & Raabe, D. (2015). Mechanisms of subgrain coarsening and its effect on the mechanical properties of carbon-supersaturated nanocrystalline hypereutectoid steel. *Acta Materialia*, *84*, 110–123. https://doi.org/10.1016/j.actamat.2014.10.027

352. Li, Y. J., Ponge, D., Choi, P., & Raabe, D. (2015). Segregation of boron at prior austenite grain boundaries in a quenched martensitic steel studied by atom probe tomography. *Scripta Materialia*, *96*(C), 13–16. https://doi.org/10.1016/j.scriptamat.2014.09.031

353. Li, Y., Raabe, D., Herbig, M., Choi, P.-P. P., Goto, S., Kostka, A., Yarita, H., Borchers, C., & Kirchheim, R. (2014). Segregation stabilizes nanocrystalline bulk steel with near theoretical strength. *Physical Review Letters*, *113*(10), 106104. https://doi.org/10.1103/PhysRevLett.113.106104

354. Li, Y., Yuan, G., Li, L., Kang, J., Yan, F., Du, P., Raabe, D., & Wang, G. (2023). Ductile 2-GPa steels with hierarchical substructure. *Science (New York, N.Y.)*, *379*(6628), 168–173. https://doi.org/10.1126/science.add7857

355. Li, Z., Körmann, F., Grabowski, B., Neugebauer, J., & Raabe, D. (2017). Ab initio assisted design of quinary dual-phase high-entropy alloys with transformation-induced plasticity. *Acta Materialia*, *136*, 262–270. https://doi.org/10.1016/j.actamat.2017.07.023

356. Li, Z., Ludwig, A., Savan, A., Springer, H., & Raabe, D. (2018). Combinatorial metallurgical synthesis and processing of high-entropy alloys. *Journal of Materials Research*, *33*(19), 3156–3169. https://doi.org/10.1557/jmr.2018.214

357. Li, Z., Pradeep, K. G., Deng, Y., Raabe, D., & Tasan, C. C. (2016). Metastable high-entropy dual-phase alloys overcome the strength-ductility trade-off. *Nature*, *534*(7606), 227–230. https://doi.org/10.1038/nature17981

358. Li, Z., & Raabe, D. (2017a). Strong and Ductile Non-equiatomic High-Entropy Alloys: Design, Processing, Microstructure, and Mechanical Properties. *JOM*, *69*(11), 2099–2106. https://doi.org/10.1007/s11837-017-2540-2

359. Li, Z., & Raabe, D. (2017b). Designing novel high-entropy alloys towards superior properties. *Frontiers in Materials Processing Applications, Research and Technology (FiMPART'2017)*.

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 37 of 87

360. Li, Z., Tasan, C. C., Pradeep, K. G., & Raabe, D. (2017). A TRIP-assisted dual-phase high-entropy alloy: Grain size and phase fraction effects on deformation behavior. *Acta Materialia*, *131*, 323–335. https://doi.org/10.1016/j.actamat.2017.03.069

361. Li, Z., Tasan, C. C., Springer, H., Gault, B., & Raabe, D. (2017). Interstitial atoms enable joint twinning and transformation induced plasticity in strong and ductile high-entropy alloys. *Scientific Reports*, *7*(January), 1–7. https://doi.org/10.1038/srep40704

362. Lia, Y. J., Choi, P., Borchers, C., Chen, Y. Z., Goto, S., Raabe, D., Kirchheim, R., Li, Y. J., Choi, P., Borchers, C., Chen, Y. Z., Goto, S., Raabe, D., & Kirchheim, R. (2011). Atom probe tomography characterization of heavily cold drawn pearlitic steel wire. *Ultramicroscopy*, *111*(6), 628–632. https://doi.org/10.1016/j.ultramic.2010.11.010

363. Liebscher, C. H., Stoffers, A., Alam, M., Lymperakis, L., Cojocaru-Mirédin, O., Gault, B., Neugebauer, J., Dehm, G., Scheu, C., & Raabe, D. (2018). Strain-induced asymmetric line segregation at faceted Si grain boundaries. *Physical Review Letters*, *121*(1), 15702. https://doi.org/10.1103/PhysRevLett.121.015702

364. Liebscher, C. H., Stoffers, A., Cojocaru-Mirédin, O., Gault, B., Scheu, C., Dehm, G., & Raabe, D. (2016). Topological Impurity Segregation at Faceted Silicon Grain Boundaries Studied by Correlative Atomic-Resolution STEM and APT. *Microscopy and Microanalysis*, *22*(S5), 46–47.

365. Liebscher, C. H., Yao, M., Dey, P., Lipińska-Chwalek, M., Berkels, B., Gault, B., Hickel, T., Herbig, M., Mayer, J., Neugebauer, J., Raabe, D., Dehm, G., & Scheu, C. (2018). Tetragonal fcc-Fe induced by κ-carbide precipitates: Atomic scale insights from correlative electron microscopy, atom probe tomography, and density functional theory. *Physical Review Materials*, *2*(2), 23804. https://doi.org/10.1103/PhysRevMaterials.2.023804

366. Lim, J., Ghoncheh Kasiri, D., Sahu, R., Schweinar, K., Hengge, K., Raabe, D., la Mantia, F., & Scheu, C. (2020). Irreversible Structural Changes of Copper Hexacyanoferrate Used as a Cathode in Zn-Ion Batteries. *Chemistry (Weinheim an Der Bergstrasse, Germany)*, *26*(22), 4917.

367. Lima, E. B. F., Pyzalla, A. R., Reimers, W., Kuo, J.-C., & Raabe, D. (2003). Mosaic Size Distributions in an Aluminum Bi-crystal Deformed by Channel Die Plane Strain Compression. *Journal of Neutron Research*, *11*(4), 209–214.

368. Lins, J. F. C. C., Sandim, H. R. Z. Z., Kestenbach, H.-J. J., Raabe, D., & Vecchio, K. S. (2007). A microstructural investigation of adiabatic shear bands in an interstitial free steel. *Materials Science and Engineering: A*, *457*(1–2), 205–218. https://doi.org/10.1016/j.msea.2006.12.019

369. Liu, B., Eisenlohr, P., Roters, F., & Raabe, D. (2012). Simulation of dislocation penetration through a general low-angle grain boundary. *Acta Materialia*, *60*(13–14), 5380–5390. https://doi.org/10.1016/j.actamat.2012.05.002

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 38 of 87

370. Liu, B., Raabe, D., Eisenlohr, P., Roters, F., Arsenlis, A., & Hommes, G. (2011). Dislocation interactions and low-angle grain boundary strengthening. *Acta Materialia*, *59*(19), 7125–7134. https://doi.org/10.1016/j.actamat.2011.07.067

371. Liu, B., Raabe, D., Roters, F., & Arsenlis, A. (2014). Interfacial dislocation motion and interactions in single-crystal superalloys. *Acta Materialia*, *79*, 216–233. https://doi.org/10.1016/j.actamat.2014.06.048

372. Liu, B., Raabe, D., Roters, F., Eisenlohr, P., & Lebensohn, R. A. (2010). Comparison of finite element and fast Fourier transform crystal plasticity solvers for texture prediction. *Modelling and Simulation in Materials Science and Engineering*, *18*(8). https://doi.org/10.1088/0965-0393/18/8/085005

373. Liu, C., Garner, A., Zhao, H., Prangnell, P. B., Gault, B., Raabe, D., & Shanthraj, P. (2021). CALPHAD-informed phase-field modeling of grain boundary microchemistry and precipitation in Al-Zn-Mg-Cu alloys. *Acta Materialia*, *214*, 116966. https://doi.org/10.1016/j.actamat.2021.116966

374. Liu, C., Lu, W., Xia, W., Du, C., Rao, Z., Best, J. P., Brinckmann, S., Lu, J., Gault, B., Dehm, G., Wu, G., Li, Z., & Raabe, D. (2022). Massive interstitial solid solution alloys achieve near-theoretical strength. *Nature Communications*, *13*(1). https://doi.org/10.1038/s41467-022-28706-w

375. Liu, C., Shanthraj, P., Diehl, M., Roters, F., Dong, S., Dong, J., Ding, W., & Raabe, D. (2018). An integrated crystal plasticity-phase field model for spatially resolved twin nucleation, propagation, and growth in hexagonal materials. *International Journal of Plasticity*, *106*(March), 203–227. https://doi.org/10.1016/j.ijplas.2018.03.009

376. Liu, C., Shanthraj, P., Robson, J. D. J. D., Diehl, M., Dong, S., Dong, J., Ding, W., & Raabe, D. (2019). On the interaction of precipitates and tensile twins in magnesium alloys. *Acta Materialia*, *178*(August), 146–162. https://doi.org/10.1016/j.actamat.2019.07.046

377. Liu, J., Chen, C., Feng, Q., Fang, X., Wang, H., Liu, F., Lu, J., & Raabe, D. (2017). Dislocation activities at the martensite phase transformation interface in metastable austenitic stainless steel: An in-situ TEM study. *Materials Science and Engineering: A*, *703*(July), 236–243. https://doi.org/10.1016/j.msea.2017.06.107

378. Liu, T., Pinto, H., Brito, P., Sales, L. A., & Raabe, D. (2009). Residual stress analysis in chemical-vapor-deposition diamond films. *Applied Physics Letters*, *94*(20), 201902. https://doi.org/10.1063/1.3139083

379. Liu, T., Raabe, D., Mao, W., & Zaefferer, S. (2009). Microtexture and grain boundaries in freestanding CVD diamond films: Growth and twinning mechanisms. *Advanced Functional Materials*, *19*(24), 3880–3891. https://doi.org/10.1002/adfm.200901231

380. Liu, T., Raabe, D., & Zaefferer, S. (2008). A 3D tomographic EBSD analysis of a CVD diamond thin film. *Science and Technology of Advanced Materials*, *9*(3). https://doi.org/10.1088/1468-6996/9/3/035013

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 39 of 87

381. Liu, W. C., Li, Z., Man, C. S., Raabe, D., & Morris, J. G. (2006). Effect of precipitation on rolling texture evolution in continuous cast AA 3105 aluminum alloy. *Materials Science and Engineering A*, *434*(1–2), 105–113. https://doi.org/10.1016/j.msea.2006.06.102

382. Liu, W. C., Man, C. S., & Raabe, D. (2010). Effect of strain hardening on texture development in cold rolled Al-Mg alloy. *Materials Science and Engineering A*, *527*(4–5), 1249–1254. https://doi.org/10.1016/j.msea.2009.09.059

383. Liu, W. C., Man, C. S., Raabe, D., & Morris, J. G. (2005). Effect of hot and cold deformation on the recrystallization texture of continuous cast AA 5052 aluminum alloy. *Scripta Materialia*, *53*(11), 1273–1277. https://doi.org/10.1016/j.scriptamat.2005.07.040

384. Lomuscio, A., Rödel, T., Schwarz, T., Gault, B., Melchiorre, M., Raabe, D., & Siebentritt, S. (2019). Quasi-Fermi-Level Splitting of Cu-Poor and Cu-Rich Cu In S 2 Absorber Layers. *Physical Review Applied*, *11*(5), 54052.

385. Lu, W., Guo, W., Wang, Z., Li, J., An, F., Dehm, G., Raabe, D., Liebscher, C. H., & Li, Z. (2023). Advancing strength and counteracting embrittlement by displacive transformation in heterogeneous high-entropy alloys containing sigma phase. *Acta Materialia*, *246*, 118717. https://doi.org/10.1016/J.ACTAMAT.2023.118717

386. Lu, W., Herbig, M., Liebscher, C. H., Morsdorf, L., Marceau, R. K. W., Dehm, G., & Raabe, D. (2018). Formation of eta carbide in ferrous martensite by room temperature aging. *Acta Materialia*, *158*, 297–312. https://doi.org/10.1016/j.actamat.2018.07.071

387. Lu, W., Liebscher, C. H., Dehm, G., Raabe, D., & Li, Z. (2018a). Bidirectional transformation enables hierarchical nanolaminate dual-phase high-entropy alloys. *Advanced Materials*, *30*(44), 1804727.

388. Lu, W., Liebscher, C. H., Dehm, G., Raabe, D., & Li, Z. (2018b). Bidirectional Transformation Enables Hierarchical Nanolaminate Dual-Phase High-Entropy Alloys. *Advanced Materials*, *30*(44), 1–10. https://doi.org/10.1002/adma.201804727

389. Lu, W., Liebscher, C. H., Yan, F., Fang, X., Li, L., Li, J., Guo, W., Dehm, G., Raabe, D., & Li, Z. (2020). Interfacial nanophases stabilize nanotwins in high-entropy alloys. *Acta Materialia*, *185*, 218–232. https://doi.org/10.1016/j.actamat.2019.12.010

390. Lu, X., Zhang, X., Shi, M., Roters, F., Kang, G., & Raabe, D. (2019). Dislocation mechanism based size-dependent crystal plasticity modeling and simulation of gradient nano-grained copper. *International Journal of Plasticity*, *113*(September), 52–73. https://doi.org/10.1016/j.ijplas.2018.09.007

391. Lübke, A., Enax, J., Loza, K., Prymak, O., Gaengler, P., Fabritius, H.-O. O., Raabe, D., & Epple, M. (2015). Dental lessons from past to present: ultrastructure and composition of teeth from plesiosaurs, dinosaurs, extinct and recent sharks. *RSC Advances*, *5*(76), 61612–61622. https://doi.org/10.1039/c5ra11560d

392. Lübke, A., Enax, J., Wey, K., Fabritius, H.-O. O., Raabe, D., & Epple, M. (2016). Composites of fluoroapatite and methylmethacrylate-based polymers (PMMA)

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 40 of 87

for biomimetic tooth replacement. *Bioinspiration & Biomimetics*, *11*(3), 35001. https://doi.org/10.1088/1748-3190/11/3/035001

393. Lücke, R. K., Raabe, D., & Lücke, K. (1992). Texture and microstructure of hot rolled steel. *Scripta Metallurgica et Materiala*, *26*(8), 1221–1226. https://doi.org/10.1016/0956-716X(92)90567-X

394. Luebke, A., Loza, K., Patnaik, R., Enax, J., Raabe, D., Prymak, O., Fabritius, H. O., Gaengler, P., & Epple, M. (2017). Reply to the "Comments on 'dental lessons from past to present: Ultrastructure and composition of teeth from plesiosaurs, dinosaurs, extinct and recent sharks'" by H. Botella: Et al., RSC Adv., 2016, 6, 74384-74388. *RSC Advances*, *7*(11), 6215–6222. https://doi.org/10.1039/c6ra27121a

395. Luo, H., Li, Z., Chen, Y. H., Ponge, D., Rohwerder, M., & Raabe, D. (2017). Hydrogen effects on microstructural evolution and passive film characteristics of a duplex stainless steel. *Electrochemistry Communications*, *79*, 28–32. https://doi.org/10.1016/j.elecom.2017.04.013

396. Luo, H., Li, Z., Lu, W., Ponge, D., & Raabe, D. (2018). Hydrogen embrittlement of an interstitial equimolar high-entropy alloy. *Corrosion Science*, *136*(September 2017), 403–408. https://doi.org/10.1016/j.corsci.2018.03.040

397. Luo, H., Li, Z., Mingers, A. M., & Raabe, D. (2018). Corrosion behavior of an equiatomic CoCrFeMnNi high-entropy alloy compared with 304 stainless steel in sulfuric acid solution. *Corrosion Science*, *134*(February), 131–139. https://doi.org/10.1016/j.corsci.2018.02.031

398. Luo, H., Li, Z., & Raabe, D. (2017). Hydrogen enhances strength and ductility of an equiatomic high-entropy alloy. *Scientific Reports*, *7*(1), 1–7. https://doi.org/10.1038/s41598-017-10774-4

399. Luo, H., Lu, W., Fang, X., Ponge, D., Li, Z., & Raabe, D. (2018). Beating hydrogen with its own weapon: Nano-twin gradients enhance embrittlement resistance of a high-entropy alloy. *Materials Today*, *21*(10), 1003–1009. https://doi.org/10.1016/j.mattod.2018.07.015

400. Luo, H., Sohn, S. S., Lu, W., Li, L., Li, X., Soundararajan, C. K., Krieger, W., Li, Z., & Raabe, D. (2020). A strong and ductile medium-entropy alloy resists hydrogen embrittlement and corrosion. *Nature Communications*, *11*(1), 1–8. https://doi.org/10.1038/s41467-020-16791-8

401. Ma, A., Roters, F., & Raabe, D. (2004). Numerical study of textures and Lankford values for FCC polycrystals by use of a modified Taylor model. *Computational Materials Science*, *29*(3), 353–361. https://doi.org/10.1016/j.commatsci.2003.10.011

402. Ma, A., Roters, F., & Raabe, D. (2006a). A dislocation density based constitutive model for crystal plasticity FEM including geometrically necessary dislocations. *Acta Materialia*, *54*(8), 2169–2179. https://doi.org/10.1016/j.actamat.2006.01.005

403. Ma, A., Roters, F., & Raabe, D. (2006b). On the consideration of interactions between dislocations and grain boundaries in crystal plasticity finite element

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 41 of 87

modeling - Theory, experiments, and simulations. *Acta Materialia*, *54*(8), 2181–2194. https://doi.org/10.1016/j.actamat.2006.01.004

404. Ma, A., Roters, F., & Raabe, D. (2006c). Studying the effect of grain boundaries in dislocation density based crystal-plasticity finite element simulations. *International Journal of Solids and Structures*, *43*(24), 7287–7303. https://doi.org/10.1016/j.ijsolstr.2006.07.006

405. Ma, A., Roters, F., & Raabe, D. (2007). A dislocation density based constitutive law for BCC materials in crystal plasticity FEM. *Computational Materials Science*, *39*(1 SPEC. ISS.), 91–95. https://doi.org/10.1016/j.commatsci.2006.04.014

406. Ma, D., Eisenlohr, P., Epler, E., Volkert, C. A., Shanthraj, P., Diehl, M., Roters, F., & Raabe, D. (2016). Crystal plasticity study of monocrystalline stochastic honeycombs under in-plane compression. *Acta Materialia*, *103*, 796–808. https://doi.org/10.1016/j.actamat.2015.11.016

407. Ma, D., Eisenlohr, P., Shanthraj, P., Diehl, M., Roters, F., & Raabe, D. (2015). Analytical bounds of in-plane Young's modulus and full-field simulations of two-dimensional monocrystalline stochastic honeycomb structures. *Computational Materials Science*, *109*, 323–329. https://doi.org/10.1016/j.commatsci.2015.07.041

408. Ma, D., Friák, M., Neugebauer, J., Raabe, D., & Roters, F. (2008). Multiscale simulation of polycrystal mechanics of textured β-Ti alloys using ab initio and crystal-based finite element methods. *Physica Status Solidi (B) Basic Research*, *245*(12), 2642–2648. https://doi.org/10.1002/pssb.200844227

409. Ma, D., Friák, M., von Pezold, J., Neugebauer, J., & Raabe, D. (2015). Ab initio study of compositional trends in solid solution strengthening in metals with low Peierls stresses. *Acta Materialia*, *98*, 367–376. https://doi.org/10.1016/j.actamat.2015.07.054

410. Ma, D., Friák, M., von Pezold, J., Raabe, D., & Neugebauer, J. (2015). Computationally efficient and quantitatively accurate multiscale simulation of solid-solution strengthening by ab initio calculation. *Acta Materialia*, *85*, 53–66. https://doi.org/10.1016/j.actamat.2014.10.044

411. Ma, D., Friák, M., von Pezold, J., Raabe, D., Neugebauer, J., Pezold, J. von, Raabe, D., & Neugebauer, J. (2013). Ab initio identified design principles of solid-solution strengthening in Al. *Science and Technology of Advanced Materials*, *14*(2), 25001. https://doi.org/10.1088/1468-6996/14/2/025001

412. Ma, D., Grabowski, B., Körmann, F., Neugebauer, J., & Raabe, D. (2015). Ab initio thermodynamics of the CoCrFeMnNi high entropy alloy: Importance of entropy contributions beyond the configurational one. *Acta Materialia*, *100*, 90–97. https://doi.org/10.1016/j.actamat.2015.08.050

413. Ma, D., Yao, M., Pradeep, K. G., Tasan, C. C., Springer, H., & Raabe, D. (2015). Phase stability of non-equiatomic CoCrFeMnNi high entropy alloys. *Acta Materialia*, *98*, 288–296. https://doi.org/10.1016/j.actamat.2015.07.030

414. Ma, Y., Souza Filho, I. R., Bai, Y., Schenk, J., Patisson, F., Beck, A., van Bokhoven, J. A., Willinger, M. G., Li, K., Xie, D., Ponge, D., Zaefferer, S., Gault, B., Mianroodi, J.

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 42 of 87

R., & Raabe, D. (2022). Hierarchical nature of hydrogen-based direct reduction of iron oxides. *Scripta Materialia*, 114571. https://doi.org/10.1016/j.scriptamat.2022.114571

415. Ma, Y., Sun, B., Schökel, A., Song, W., Ponge, D., Raabe, D., & Bleck, W. (2020). Phase boundary segregation-induced strengthening and discontinuous yielding in ultrafine-grained duplex medium-Mn steels. *Acta Materialia*, *200*, 389–403.

416. Maaß, R., van Petegem, S., Ma, D., Zimmermann, J., Grolimund, D., Roters, F., van Swygenhoven, H., & Raabe, D. (2009). Smaller is stronger: The effect of strain hardening. *Acta Materialia*, *57*(20), 5996–6005. https://doi.org/10.1016/j.actamat.2009.08.024

417. MacDonald, B. E., Fu, Z., Wang, X., Li, Z., Chen, W., Zhou, Y., Raabe, D., Schoenung, J., Hahn, H., & Lavernia, E. J. (2019). Influence of phase decomposition on mechanical behavior of an equiatomic CoCuFeMnNi high entropy alloy. *Acta Materialia*, *181*, 25–35. https://doi.org/10.1016/j.actamat.2019.09.030

418. Makineni, S. K., Kini, A. R., Jägle, E. A., Springer, H., Raabe, D., & Gault, B. (2018). Synthesis and stabilization of a new phase regime in a Mo-Si-B based alloy by laser-based additive manufacturing. *Acta Materialia*, *151*, 31–40. https://doi.org/10.1016/j.actamat.2018.03.037

419. Makineni, S. K., Kumar, A., Lenz, M., Kontis, P., Meiners, T., Zenk, C., Zaefferer, S., Eggeler, G., Neumeier, S., Spiecker, E., Raabe, D., & Gault, B. (2018). On the diffusive phase transformation mechanism assisted by extended dislocations during creep of a single crystal CoNi-based superalloy. *Acta Materialia*, *155*, 362–371. https://doi.org/10.1016/j.actamat.2018.05.074

420. Makineni, S. K., Lenz, M., Kontis, P., Li, Z., Kumar, A., Felfer, P. J., Neumeier, S., Herbig, M., Spiecker, E., Raabe, D., & Gault, B. (2018). Correlative Microscopy—Novel Methods and Their Applications to Explore 3D Chemistry and Structure of Nanoscale Lattice Defects: A Case Study in Superalloys. *JOM*, *70*(9), 1736–1743. https://doi.org/10.1007/s11837-018-2802-7

421. Makineni, S. K., Lenz, M., Neumeier, S., Spiecker, E., Raabe, D., & Gault, B. (2018). Elemental segregation to antiphase boundaries in a crept CoNi-based single crystal superalloy. *Scripta Materialia*, *157*, 62–66. https://doi.org/10.1016/j.scriptamat.2018.07.042

422. Mandal, S., Chikkadi, V., Nienhuis, B., Raabe, D., Schall, P., & Varnik, F. (2013). Single-particle fluctuations and directional correlations in driven hard-sphere glasses. *Physical Review E*, *88*(2), 22129. https://doi.org/10.1103/PhysRevE.88.022129

423. Mandal, S., Gross, M., Raabe, D., & Varnik, F. (2012). Heterogeneous shear in hard sphere glasses. *Physical Review Letters*, *108*(9), 98301. https://doi.org/10.1103/PhysRevLett.108.098301

424. Mandal, S., Lang, S., Gross, M., Oettel, M., Raabe, D., Franosch, T., & Varnik, F. (2014). Multiple reentrant glass transitions in confined hard-sphere glasses. *Nature Communications*, *5*(1), 1–8. https://doi.org/10.1038/ncomms5435

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 43 of 87

425. Mandal, S., Pradeep, K. G., Zaefferer, S., & Raabe, D. (2014). A novel approach to measure grain boundary segregation in bulk polycrystalline materials in dependence of the boundaries' five rotational degrees of freedom. *Scripta Materialia*, *81*, 16–19. https://doi.org/10.1016/j.scriptamat.2014.02.016

426. Maniruzzaman, M., Rahman, M. A., Gafur, M. A., Fabritius, H., & Raabe, D. (2012). Modification of pineapple leaf fibers and graft copolymerization of acrylonitrile onto modified fibers. *Journal of Composite Materials*, *46*(1), 79–90. https://doi.org/10.1177/0021998311410486

427. Marceau, R. K. W., Ceguerra, A. V., Breen, A. J., Palm, M., Stein, F., Ringer, S. P., & Raabe, D. (2015a). Atom probe tomography investigation of heterogeneous short-range ordering in the 'komplex'phase state (K-state) of Fe–18Al (at.%). *Intermetallics*, *64*, 23–31.

428. Marceau, R. K. W., Ceguerra, A. v., Breen, A. J., Palm, M., Stein, F., Ringer, S. P., & Raabe, D. (2015b). Atom probe tomography investigation of heterogeneous short-range ordering in the "komplex" phase state (K-state) of Fe-18Al (at.%). *Intermetallics*, *64*, 23–31. https://doi.org/10.1016/j.intermet.2015.04.005

429. Marceau, R. K. W., Choi, P., & Raabe, D. (2013). Understanding the detection of carbon in austenitic high-Mn steel using atom probe tomography. *Ultramicroscopy*, *132*, 239–247. https://doi.org/10.1016/j.ultramic.2013.01.010

430. Marceau, R. K. W., Gutierrez-Urrutia, I., Herbig, M., Moore, K. L., Lozano-Perez, S., & Raabe, D. (2013). Multi-scale correlative microscopy investigation of both structure and chemistry of deformation twin bundles in Fe-Mn-C steel. *Microscopy and Microanalysis*, *19*(6), 1581–1585. https://doi.org/10.1017/S1431927613013494

431. Marceau, R. K. W. W., Ceguerra, A. V., Breen, A. J., Raabe, D., & Ringer, S. P. (2015). Quantitative chemical-structure evaluation using atom probe tomography: Short-range order analysis of Fe–Al. *Ultramicroscopy*, *157*, 12–20. https://doi.org/10.1016/j.ultramic.2015.05.001

432. Marquis, E. A., Choi, P.-P., Danoix, F., Kruska, K., Lozano-Perez, S., Ponge, D., Raabe, D., & Williams, C. A. (2012). New Insights into the Atomic-Scale Structures and Behavior of Steels. *Microscopy Today*, *20*(4), 44–48. https://doi.org/10.1017/s1551929512000387

433. Marx, V., Raabe, D., Engler, O., & Gottstein, G. (1997). Simulation of the Texture Evolution During Annealing of Cold Rolled Bcc and Fcc Metals Using a Cellular Automation Approach. *Textures and Microstructures*, *28*(3–4), 211–218.

434. Mattern, N., Han, J. H., Pradeep, K. G., Kim, K. C., Park, E. M., Kim, D. H., Yokoyama, Y., Raabe, D., & Eckert, J. (2014a). *J Alloys and Compunds 2014 APT metallic glass Mattern Pradeep Raabe Eckert*. *607*, 285–290.

435. Mattern, N., Han, J. H., Pradeep, K. G., Kim, K. C., Park, E. M., Kim, D. H., Yokoyama, Y., Raabe, D., & Eckert, J. (2014b). Structure of rapidly quenched (Cu 0.5 Zr 0.5) 100-x Ag x alloys (x = 0-40 at.%). *Journal of Alloys and Compounds*, *607*, 285–290. https://doi.org/10.1016/j.jallcom.2014.04.047

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 44 of 87

436. Mattern, N., Han, J. H., Pradeep, K. G., Kim, K. C., Park, E. M., Kim, D. H., Yokoyama, Y., Raabe, D., & Eckert, J. (2014c). Structure of rapidly quenched (Cu0. 5Zr0. 5) 100− xAgx alloys (x= 0–40 at.%). *Journal of Alloys and Compounds*, *607*, 285–290.

437. Mattissen, D., Raabe, D., & Heringhaus, F. (1999). Experimental investigation and modeling of the influence of microstructure on the resistive conductivity of a Cu–Ag–Nb in situ composite. *Acta Materialia*, *47*(5), 1627–1634. https://doi.org/10.1016/S1359-6454(99)00026-9

438. Matuszewski, K., Rettig, R., Matysiak, H., Peng, Z., Povstugar, I., Choi, P., Müller, J., Raabe, D., Spiecker, E., Kurzydłowski, K. J., & Singer, R. F. (2015). Effect of ruthenium on the precipitation of topologically close packed phases in Ni-based superalloys of 3rd and 4th generation. *Acta Materialia*, *95*, 274–283. https://doi.org/10.1016/j.actamat.2015.05.033

439. Medrano, S., Zhao, H., de Geuser, F., Gault, B., Stephenson, L. T., Deschamps, A., Ponge, D., Raabe, D., & Sinclair, C. W. (2018). Cluster hardening in Al-3Mg triggered by small Cu additions. *Acta Materialia*, *161*, 12–20. https://doi.org/10.1016/j.actamat.2018.08.050

440. Mehrtens, T., Bley, S., Schowalter, M., Sebald, K., Seyfried, M., Gutowski, J., Gerstl, S. S. A., Choi, P. P., Raabe, D., & Rosenauer, A. (2011a). A (S)TEM and atom probe tomography study of InGaN. *Journal of Physics: Conference Series*, *326*(1), 1–5. https://doi.org/10.1088/1742-6596/326/1/012029

441. Mehrtens, T., Bley, S., Schowalter, M., Sebald, K., Seyfried, M., Gutowski, J., Gerstl, S. S. A., Choi, P.-P., Raabe, D., & Rosenauer, A. (2011b). A (S) TEM and atom probe tomography study of InGaN. *Journal of Physics: Conference Series*, *326*(1), 12029.

442. Mehrtens, T., Schowalter, M., Tytko, D., Choi, P., Raabe, D., Hoffmann, L., Jönen, H., Rossow, U., Hangleiter, A., & Rosenauer, A. (2013). Measurement of the indium concentration in high indium content InGaN layers by scanning transmission electron microscopy and atom probe tomography. *Applied Physics Letters*, *102*(13), 100–103. https://doi.org/10.1063/1.4799382

443. Mianroodi, J. R., H. Siboni, N., & Raabe, D. (2021). Teaching solid mechanics to artificial intelligence—a fast solver for heterogeneous materials. *Npj Computational Materials*, *7*(1), 1–10. https://doi.org/10.1038/s41524-021-00571-z

444. Mianroodi, J. R., Rezaei, S., Siboni, N. H., Xu, B.-X., & Raabe, D. (2021). Lossless Multi-Scale Constitutive Elastic Relations with Artificial Intelligence. *Npj Computational Materials*, *8*(67), 1–12. https://doi.org/10.1038/s41524-022-00753-3

445. Mianroodi, J. R., Shanthraj, P., Kontis, P., Cormier, J., Gault, B., Svendsen, B., & Raabe, D. (2019). Atomistic phase field chemomechanical modeling of dislocation-solute-precipitate interaction in Ni–Al–Co. *Acta Materialia*, *175*(2018), 250–261. https://doi.org/10.1016/j.actamat.2019.06.008

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 45 of 87

446. Mianroodi, J. R., Shanthraj, P., Svendsen, B., & Raabe, D. (2021). Phase-Field Modeling of Chemoelastic Binodal/Spinodal Relations and Solute Segregation to Defects in Binary Alloys. *Materials*, *14*(7), 1787.

447. Mianroodi, J. R., Siboni, N. H., & Raabe, D. (2022). Computational Discovery of Energy-Efficient Heat Treatment for Microstructure Design using Deep Reinforcement Learning. *ArXiv E-Prints*. https://doi.org/10.48550/arxiv.2209.11259

448. Millan, J., Ponge, D., Raabe, D., Choi, P., & Dmitrieva, O. (2011). Characterization of Nano-Sized Precipitates in a Mn-Based Lean Maraging Steel by Atom Probe Tomography. *Steel Research International*, *82*(2), 137–145.

449. Millán, J., Ponge, D., Raabe, D., Choi, P., & Dmitrieva, O. (2011). Characterization of nano-sized precipitates in a Mn-based lean maraging steel by atom probe tomography. *Steel Research International*, *82*(2), 137–145. https://doi.org/10.1002/srin.201000274

450. Millán, J., Sandlöbes, S., Al-Zubi, A., Hickel, T., Choi, P., Neugebauer, J., Ponge, D., & Raabe, D. (2014). Designing Heusler nanoprecipitates by elastic misfit stabilization in Fe-Mn maraging steels. *Acta Materialia*, *76*, 94–105. https://doi.org/10.1016/j.actamat.2014.05.016

451. M.J. Lai, C.C. Tasan, J. Zhang, B. Grabowski, L.F. Huang, & D. Raabe. (2015). Origin of shear induced b to x transition in Ti–Nb-based alloys. *Acta Materialia*, *92*, 55–63. https://ac.els-cdn.com/S1359645415002165/1-s2.0-S1359645415002165-main.pdf?_tid=4539944a-ddb3-11e7-a6ce-00000aab0f02&acdnat=1512914957_e79dc047cd90722ff740afce0b6594df

452. Moon, J., Ha, H.-Y., Kim, K.-W., Park, S.-J., Lee, T.-H., Kim, S.-D., Jang, J. H., Jo, H.-H., Hong, H.-U., & Lee, B. H. (2020). A new class of lightweight, stainless steels with ultra-high strength and large ductility. *Scientific Reports*, *10*(1), 1–10.

453. Moon, J., Jo, H.-H., Park, S.-J., Kim, S.-D., Lee, T.-H., Lee, C.-H., Lee, M.-G., Hong, H.-U., Suh, D.-W., & Raabe, D. (2021). Ti-bearing lightweight steel with large high temperature ductility via thermally stable multi-phase microstructure. *Materials Science and Engineering: A*, *808*, 140954.

454. Morales-Rivas, L., Archie, F., Zaefferer, S., Benito-Alfonso, M., Tsai, S.-P. P., Yang, J.-R. R., Raabe, D., Garcia-Mateo, C., & Caballero, F. G. (2018). Crystallographic examination of the interaction between texture evolution, mechanically induced martensitic transformation and twinning in nanostructured bainite. *Journal of Alloys and Compounds*, *752*, 505–519. https://doi.org/10.1016/j.jallcom.2018.04.189

455. Moravcik, I., Hadraba, H., Li, L., Dlouhy, I., Raabe, D., & Li, Z. (2020). Yield strength increase of a CoCrNi medium entropy alloy by interstitial nitrogen doping at maintained ductility. *Scripta Materialia*, *178*, 391–397. https://doi.org/10.1016/j.scriptamat.2019.12.007

456. Moravcik, I., Hornik, V., Minárik, P., Li, L., Dlouhy, I., Janovska, M., Raabe, D., Li, Z., Moravcik, I., Hornik, V., Min, P., Minárik, P., Li, L., Dlouhy, I., Janovska, M., Raabe, D., & Li, Z. (2020). Interstitial doping enhances the strength-ductility

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 46 of 87

synergy in a CoCrNi medium entropy alloy. *Materials Science and Engineering: A*, *781*(October 2019), 1–14. https://doi.org/10.1016/j.msea.2020.139242

457. Morgado, F. F., Katnagallu, S., Freysoldt, C., Klaes, B., Vurpillot, F., Neugebauer, J., Raabe, D., Neumeier, S., Gault, B., & Stephenson, L. T. (2021). Revealing atomic-scale vacancy-solute interaction in nickel. *Scripta Materialia*, *203*, 114036.

458. Morsdorf, L., Jeannin, O., Barbier, D., Mitsuhara, M., Raabe, D., & Tasan, C. C. (2016). Multiple mechanisms of lath martensite plasticity. *Acta Materialia*, *121*, 202–214. https://doi.org/10.1016/j.actamat.2016.09.006

459. Morsdorf, L., Mayweg, D., Li, Y., Diederichs, A., Raabe, D., & Herbig, M. (2020). Moving cracks form white etching areas during rolling contact fatigue in bearings. *Materials Science and Engineering: A*, *771*, 138659.

460. Morsdorf, L., Pradeep, K. G., Herzer, G., Kovács, A., Dunin-Borkowski, R. E., Povstugar, I., Konygin, G., Choi, P., & Raabe, D. (2016). Phase selection and nanocrystallization in Cu-free soft magnetic FeSiNbB amorphous alloy upon rapid annealing. *Journal of Applied Physics*, *119*(12), 124903. https://doi.org/10.1063/1.4944595

461. Morsdorf, L., Tasan, C. C., Ponge, D., & Raabe, D. (2015). 3D structural and atomic-scale analysis of lath martensite: Effect of the transformation sequence. *Acta Materialia*, *95*, 366–377. https://doi.org/10.1016/j.actamat.2015.05.023

462. Mouton, I., Breen, A. J., Wang, S., Chang, Y., Szczepaniak, A., Kontis, P., Stephenson, L. T., Raabe, D., Herbig, M., Britton, T. ben, & Gault, B. (2019). Quantification Challenges for Atom Probe Tomography of Hydrogen and Deuterium in Zircaloy-4. *Microscopy and Microanalysis*, *25*(2), 481–488. https://doi.org/10.1017/S143192761801615X

463. Nagashima, T., Koyama, M., Bashir, A., Rohwerder, M., Tasan, C. C., Akiyama, E., Raabe, D., & Tsuzaki, K. (2017). Interfacial hydrogen localization in austenite/martensite dual-phase steel visualized through optimized silver decoration and scanning Kelvin probe force microscopy. *Materials and Corrosion*, *68*(3), 306–310. https://doi.org/10.1002/maco.201609104

464. Nakada, N., Fukagawa, R., Tsuchiyama, T., Takaki, S., Ponge, D., & Raabe, D. (2013). Inheritance of dislocations and crystallographic texture during martensitic reversion into austenite. *ISIJ International*, *53*(7), 1286–1288. https://doi.org/10.2355/isijinternational.53.1286

465. Nakada, N., Tsuchiyama, T., Takaki, S., Ponge, D., & Raabe, D. (2013). Transition from diffusive to displacive austenite reversion in low-alloy steel. *ISIJ International*, *53*(12), 2275–2277. https://doi.org/10.2355/isijinternational.53.2275

466. Nellessen, J., Sandlöbes, S., & Raabe, D. (2015). Effects of strain amplitude, cycle number and orientation on low cycle fatigue microstructures in austenitic stainless steel studied by electron channelling contrast imaging. *Acta Materialia*, *87*, 86–99. https://doi.org/10.1016/j.actamat.2014.12.024

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 47 of 87

467. Nellessen, J., Sandlöbes, S., & Raabe, D. (2016). Low cycle fatigue in aluminum single and bi-crystals: On the influence of crystal orientation. *Materials Science and Engineering: A*, *668*, 166–179. https://doi.org/10.1016/j.msea.2016.05.054

468. Nematollahi, G. A., Grabowski, B., Raabe, D., & Neugebauer, J. (2016). Multiscale description of carbon-supersaturated ferrite in severely drawn pearlitic wires. *Acta Materialia*, *111*, 321–334. https://doi.org/10.1016/j.actamat.2016.03.052

469. Nematollahi, G. A., von Pezold, J., Neugebauer, J., & Raabe, D. (2013). Thermodynamics of carbon solubility in ferrite and vacancy formation in cementite in strained pearlite. *Acta Materialia*, *61*(5), 1773–1784. https://doi.org/10.1016/j.actamat.2012.12.001

470. Nene, S. S., Liu, K., Frank, M., Mishra, R. S., Brennan, R. E., Cho, K. C., Li, Z., & Raabe, D. (2017). Enhanced strength and ductility in a friction stir processing engineered dual phase high entropy alloy. *Scientific Reports*, *7*(1), 1–7. https://doi.org/10.1038/s41598-017-16509-9

471. Niendorf, T., Wegener, T., Li, Z., & Raabe, D. (2018). Unexpected cyclic stress-strain response of dual-phase high-entropy alloys induced by partial reversibility of deformation. *Scripta Materialia*, *143*, 63–67. https://doi.org/10.1016/j.scriptamat.2017.09.013

472. Nikolov, S., Fabritius, H. O., Friák, M., Raabe, D., & Neugebauer, J. (2012). Hierarchical modeling of biological nanocomposites. *Mechanics of Nanomaterials and Nanotechnology (Series in Applied Mathematics and Mechanics)*, 199–224.

473. Nikolov, S., Fabritius, H., Petrov, M., Friák, M., Lymperakis, L., Sachs, C., Raabe, D., & Neugebauer, J. (2011). Robustness and optimal use of design principles of arthropod exoskeletons studied by ab initio-based multiscale simulations. *Journal of the Mechanical Behavior of Biomedical Materials*, *4*(2), 129–145. https://doi.org/10.1016/j.jmbbm.2010.09.015

474. Nikolov, S., Han, C.-S., & Raabe, D. (2007). On the origin of size effects in small-strain elasticity of solid polymers. *International Journal of Solids and Structures*, *44*(5), 1582–1592.

475. Nikolov, S., Lebensohn, R. A., & Raabe, D. (2006). Self-consistent modeling of large plastic deformation, texture and morphology evolution in semi-crystalline polymers. *Journal of the Mechanics and Physics of Solids*, *54*(7), 1350–1375. https://doi.org/10.1016/j.jmps.2006.01.008

476. Nikolov, S., Petrov, M., Lymperakis, L., Friák, M., Sachs, C., Fabritius, H. O., Raabe, D., & Neugebauer, J. (2010). Revealing the design principles of high-performance biological composites using Ab initio and multiscale simulations: The example of lobster cuticle. *Advanced Materials*, *22*(4), 519–526. https://doi.org/10.1002/adma.200902019

477. Nikolov, S., & Raabe, D. (2006). Yielding of polyethylene through propagation of chain twist defects: Temperature, stem length and strain-rate dependence. *Polymer*, *47*(5), 1696–1703.

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 48 of 87

478. Nikolov, S., & Raabe, D. (2008). Hierarchical modeling of the elastic properties of bone at submicron scales: The role of extrafibrillar mineralization. *Biophysical Journal*, *94*(11), 4220–4232. https://doi.org/10.1529/biophysj.107.125567

479. Oh, H. S., Kim, S. J., Odbadrakh, K., Ryu, W. H., Yoon, K. N., Mu, S., Körmann, F., Ikeda, Y., Tasan, C. C., Raabe, D., Egami, T., & Park, E. S. (2019). Engineering atomic-level complexity in high-entropy and complex concentrated alloys. *Nature Communications*, *10*(1). https://doi.org/10.1038/s41467-019-10012-7

480. Oh, H. S., Ma, D., Leyson, G. P., Grabowski, B., Park, E. S., Kormann, F., & Raabe, D. (2016). Lattice distortions in the FeCoNiCrMn high entropy alloy studied by theory and experiment. *Entropy*, *18*(9), 1–9. https://doi.org/10.3390/e18090321

481. Oliveira, V. B., Sandim, H. R. Z., & Raabe, D. (2017). Abnormal grain growth in Eurofer-97 steel in the ferrite phase field. *Journal of Nuclear Materials*, *485*, 23–38.

482. Orava, J., Balachandran, S., Han, X., Shuleshova, O., Nurouzi, E., Soldatov, I., Oswald, S., Gutowski, O., Ivashko, O., Dippel, A.-C., Zimmermann, M. v., Ivanov, Y. P., Greer, A. L., Raabe, D., Herbig, M., & Kaban, I. (2021). In situ correlation between metastable phase-transformation mechanism and kinetics in a metallic glass. *Nature Communications*, *12*(1), 1–13. https://doi.org/10.1038/s41467-021-23028-9

483. Otto, F., Dlouhý, A., Pradeep, K. G. G., Kuběnová, M., Raabe, D., Eggeler, G., & George, E. P. P. (2016). Decomposition of the single-phase high-entropy alloy CrMnFeCoNi after prolonged anneals at intermediate temperatures. *Acta Materialia*, *112*, 40–52. https://doi.org/10.1016/j.actamat.2016.04.005

484. Özgün, Ö., Dirba, I., Gutfleisch, O., Ma, Y., & Raabe, D. (2024). Green Ironmaking at Higher H2 Pressure : Reduction Kinetics and Microstructure Formation During Hydrogen - Based Direct Reduction of Hematite Pellets. *Journal of Sustainable Metallurgy*, *0123456789*. https://doi.org/10.1007/s40831-024-00877-4

485. Palanisamy, D., Ener, S., Maccari, F., Schäfer, L., Skokov, K. P., Gutfleisch, O., Raabe, D., & Gault, B. (2020). Grain boundary segregation, phase formation, and their influence on the coercivity of rapidly solidified SmF e 11 Ti hard magnetic alloys. *Physical Review Materials*, *4*(5), 54404. https://doi.org/10.1103/physrevmaterials.4.054404

486. Palanisamy, D., Kovács, A., Hegde, O., Dunin-Borkowski, R. E., Raabe, D., Hickel, T., & Gault, B. (2021). Influence of crystalline defects on magnetic nanodomains in a rare-earth-free magnetocrystalline anisotropic alloy. *Physical Review Materials*, *5*(6), 64403.

487. Palanisamy, D., Raabe, D., & Gault, B. (2018). Elemental segregation to twin boundaries in a MnAl ferromagnetic Heusler alloy. *Scripta Materialia*, *155*, 144–148. https://doi.org/10.1016/j.scriptamat.2018.06.037

488. Palanisamy, D., Raabe, D., & Gault, B. (2019). On the compositional partitioning during phase transformation in a binary ferromagnetic MnAl alloy. *Acta Materialia*, *174*, 227–236. https://doi.org/10.1016/j.actamat.2019.05.037

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 49 of 87

489. Pandey, P., Makineni, S. K., Samanta, A., Sharma, A., Das, S. M., Nithin, B., Srivastava, C., Singh, A. K., Raabe, D., Gault, B., & Chattopadhyay, K. (2019). Elemental site occupancy in the L12 A3B ordered intermetallic phase in Co-based superalloys and its influence on the microstructure. *Acta Materialia*, *163*, 140–153. https://doi.org/10.1016/j.actamat.2018.09.049

490. Park, Y. B., Raabe, D., & Yim, T. H. (1996a). Cold rolling textures of Fe-Ni soft magnetic alloys. *Scripta Materialia*, *35*(11), 1277–1284. https://doi.org/10.1016/1359-6462(96)00308-9

491. Park, Y. B., Raabe, D., & Yim, T. H. (1996b). Rolling and recrystallization textures in Fe-Ni alloys. *Metals and Materials*, *2*(3), 151–157.

492. Parsa, A. B., Wollgramm, P., Buck, H., Somsen, C., Kostka, A., Povstugar, I., Choi, P. P., Raabe, D., Dlouhy, A., Müller, J., Spiecker, E., Demtroder, K., Schreuer, J., Neuking, K., & Eggeler, G. (2015). Advanced scale bridging microstructure analysis of single crystal Ni-base superalloys. *Advanced Engineering Materials*, *17*(2), 216–230. https://doi.org/10.1002/adem.201400136

493. Pauna, H., Ernst, D., Zarl, M., Souza Filho, I. R. de, Kulse, M., Büyükuslu, Ö., Jovičević-Klug, M., Springer, H., Huttula, M., Schenk, J., Fabritius, T., & Raabe, D. (2024). The Optical Spectra of Hydrogen Plasma Smelting Reduction of Iron Ore: Application and Requirements. *Steel Research International*, *95*(8). https://doi.org/10.1002/srin.202400028

494. Pavlic, O., Ibarra-Hernandez, W., Valencia-Jaime, I., Singh, S., Avendano-Franco, G., Raabe, D., Romero, A. H., Avendaño-Franco, G., Raabe, D., & Romero, A. H. (2017). Design of Mg alloys: The effects of Li concentration on the structure and elastic properties in the Mg-Li binary system by first principles calculations. *Journal of Alloys and Compounds*, *691*, 15–25. https://doi.org/10.1016/j.jallcom.2016.08.217

495. Pei, Z., Friák, M., Sandlöbes, S., Nazarov, R., Svendsen, B., Raabe, D., & Neugebauer, J. (2015). Rapid theory-guided prototyping of ductile Mg alloys: from binary to multi-component materials. *New Journal of Physics*, *17*(9), 93009. https://doi.org/10.1088/1367-2630/17/9/093009

496. Pei, Z., Ma, D., Friák, M., Svendsen, B., Raabe, D., & Neugebauer, J. (2015). From generalized stacking fault energies to dislocation properties: Five-energy-point approach and solid solution effects in magnesium. *Physical Review B*, *92*(6), 64107.

497. Pei, Z., Yin, J., Liaw, P. K., & Raabe, D. (2023). Toward the design of ultrahigh-entropy alloys via mining six million texts. *Nature Communications*, *14*, 54. https://doi.org/10.1038/s41467-022-35766-5

498. Pei, Z., Zhu, L.-F. F., Friák, M., Sandlöbes, S., von Pezold, J., Sheng, H. W., Race, C. P., Zaefferer, S., Svendsen, B., Raabe, D., & Neugebauer, J. (2013). Ab initio and atomistic study of generalized stacking fault energies in Mg and Mg–Y alloys. *New Journal of Physics*, *15*(4), 43020. https://doi.org/10.1088/1367-2630/15/4/043020

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 50 of 87

499. Peivaste, I., Siboni, N. H., Alahyarizadeh, G., Ghaderi, R., Svendsen, B., Raabe, D., & Mianroodi, J. R. (2022a). Accelerating phase-field-based simulation via machine learning. *ArXiv*. https://doi.org/10.48550/arxiv.2205.02121

500. Peivaste, I., Siboni, N. H., Alahyarizadeh, G., Ghaderi, R., Svendsen, B., Raabe, D., & Mianroodi, J. R. (2022b). Machine-learning-based surrogate modeling of microstructure evolution using phase-field. *Computational Materials Science*, *214*, 111750. https://doi.org/10.1016/j.commatsci.2022.111750

501. Peng, Z., Choi, P. P., Gault, B., & Raabe, D. (2017). Evaluation of Analysis Conditions for Laser-Pulsed Atom Probe Tomography: Example of Cemented Tungsten Carbide. *Microscopy and Microanalysis*, *23*(2), 431–442. https://doi.org/10.1017/S1431927616012654

502. Peng, Z., Gault, B., Raabe, D., Ashton, M. W., Sinnott, S. B., Choi, P.-P., & Li, Y. (2017). On the Multiple Event Detection in Atom Probe Tomography. *Microscopy and Microanalysis*, *23*(S1), 618–619. https://doi.org/10.1017/s1431927617003762

503. Peng, Z., Lu, Y., Hatzoglou, C., Kwiatkowski Da Silva, A., Vurpillot, F., Ponge, D., Raabe, D., & Gault, B. (2019). An Automated Computational Approach for Complete In-Plane Compositional Interface Analysis by Atom Probe Tomography. *Microscopy and Microanalysis*, *25*(2), 389–400. https://doi.org/10.1017/S1431927618016112

504. Peng, Z., Povstugar, I., Matuszewski, K., Rettig, R., Singer, R., Kostka, A., Choi, P. P., & Raabe, D. (2015). Effects of Ru on elemental partitioning and precipitation of topologically close-packed phases in Ni-based superalloys. *Scripta Materialia*, *101*, 44–47. https://doi.org/10.1016/j.scriptamat.2015.01.014

505. Peng, Z., Rohwerder, M., Choi, P. P., Gault, B., Meiners, T., Friedrichs, M., Kreilkamp, H., Klocke, F., & Raabe, D. (2017). Atomic diffusion induced degradation in bimetallic layer coated cemented tungsten carbide. *Corrosion Science*, *120*, 1–13. https://doi.org/10.1016/j.corsci.2017.01.007

506. Peng, Z., Vurpillot, F., Choi, P. P., Li, Y., Raabe, D., & Gault, B. (2018). On the detection of multiple events in atom probe tomography. *Ultramicroscopy*, *189*, 54–60. https://doi.org/10.1016/j.ultramic.2018.03.018

507. Peng, Z., Zanuttini, D., Gervais, B., Jacquet, E., Blum, I., Choi, P. P., Raabe, D., Vurpillot, F., & Gault, B. (2019). Unraveling the Metastability of Cn2+ (n = 2-4) Clusters. *Journal of Physical Chemistry Letters*, *10*(3), 581–588. https://doi.org/10.1021/acs.jpclett.8b03449

508. Peranio, N., Li, Y. J., Roters, F., & Raabe, D. (2010). Microstructure and texture evolution in dual-phase steels: Competition between recovery, recrystallization, and phase transformation. *Materials Science and Engineering A*, *527*(16–17), 4161–4168. https://doi.org/10.1016/j.msea.2010.03.028

509. Pierce, D. T., Jiménez, J. A., Bentley, J., Raabe, D., Oskay, C., & Wittig, J. E. (2014). The influence of manganese content on the stacking fault and austenite/ε-martensite interfacial energies in Fe–Mn–(Al–Si) steels investigated by

experiment and theory. *Acta Materialia*, *68*, 238–253. https://doi.org/10.1016/j.actamat.2014.01.001

510. Pierce, D. T., Jiménez, J. A., Bentley, J., Raabe, D., & Wittig, J. E. (2015). The influence of stacking fault energy on the microstructural and strain-hardening evolution of Fe–Mn–Al–Si steels during tensile deformation. *Acta Materialia*, *100*, 178–190. https://doi.org/10.1016/j.actamat.2015.08.030

511. Plancher, E., Tasan, C. C., Sandloebes, S., & Raabe, D. (2013a). On dislocation involvement in Ti – Nb gum metal plasticity Author ' s personal copy. *Scripta Materialia*, *68*, 805–808.

512. Plancher, E., Tasan, C. C., Sandloebes, S., & Raabe, D. (2013b). On dislocation involvement in Ti-Nb gum metal plasticity. *Scripta Materialia*, *68*(10), 805–808. https://doi.org/10.1016/j.scriptamat.2013.01.034

513. Povstugar, I., Choi, P. P., Neumeier, S., Bauer, A., Zenk, C. H., Göken, M., & Raabe, D. (2014). Elemental partitioning and mechanical properties of Ti- and Ta-containing Co-Al-W-base superalloys studied by atom probe tomography and nanoindentation. *Acta Materialia*, *78*, 78–85. https://doi.org/10.1016/j.actamat.2014.06.020

514. Povstugar, I., Choi, P.-P. P., Tytko, D., Ahn, J.-P. P., & Raabe, D. (2013). Interface-directed spinodal decomposition in TiAlN/CrN multilayer hard coatings studied by atom probe tomography. *Acta Materialia*, *61*(20), 7534–7542. https://doi.org/10.1016/j.actamat.2013.08.028

515. Povstugar, I., Zenk, C. H., Li, R., Choi, P.-P. P., Neumeier, S., Dolotko, O., Hoelzel, M., Göken, M., & Raabe, D. (2016). Elemental partitioning, lattice misfit and creep behaviour of Cr containing gammaprime strengthened Co base superalloys. *Materials Science and Technology (United Kingdom)*, *32*(3), 220–225. https://doi.org/10.1179/1743284715Y.0000000112

516. Pradeep, K. G., Herzer, G., Choi, P., & Raabe, D. (2014). Atom probe tomography study of ultrahigh nanocrystallization rates in FeSiNbBCu soft magnetic amorphous alloys on rapid annealing. *Acta Materialia*, *68*, 295–309. https://doi.org/10.1016/j.actamat.2014.01.031

517. Pradeep, K. G., Herzer, G., & Raabe, D. (2015). Atomic scale study of CU clustering and pseudo-homogeneous Fe-Si nanocrystallization in soft magnetic FeSiNbB(CU) alloys. *Ultramicroscopy*, *159*, 285–291. https://doi.org/10.1016/j.ultramic.2015.04.006

518. Pradeep, K. G., Wanderka, N., Choi, P., Banhart, J., Murty, B. S., & Raabe, D. (2013). Atomic-scale compositional characterization of a nanocrystalline AlCrCuFeNiZn high-entropy alloy using atom probe tomography. *Acta Materialia*, *61*(12), 4696–4706. https://doi.org/10.1016/j.actamat.2013.04.059

519. Prakash, A., Guénolé, J., Wang, J., Müller, J., Spiecker, E., Mills, M. J., Povstugar, I., Choi, P., Raabe, D., & Bitzek, E. (2015). Atom probe informed simulations of dislocation-precipitate interactions reveal the importance of local interface curvature. *Acta Materialia*, *92*, 33–45. https://doi.org/10.1016/j.actamat.2015.03.050

520. Pristovsek, M., Han, Y., Zhu, T., Oehler, F., Tang, F., Oliver, R. A., Humphreys, C. J., Tytko, D., Choi, P. P., Raabe, D., Brunner, F., & Weyers, M. (2016). Structural and optical properties of (1122) InGaN quantum wells compared to (0001) and (1120). *Semiconductor Science and Technology*, *31*(8), 1–8. https://doi.org/10.1088/0268-1242/31/8/085007

521. Pristovsek, M., Han, Y., Zhu, T., Oehler, F., Tang, F., Oliver, R. A., Humphreys, C. J., Tytko, D., Choi, P.-P., & Raabe, D. (2016). Structural and optical properties of (11$\bar{2}\bar{2}$) InGaN quantum wells compared to (0001) and (11$\bar{2}$0). *Semiconductor Science and Technology*, *31*(8), 85007.

522. Prymak, O., Enax, J., Fabritius, H., Raabe, D., & Epple, M. (2013). Correlation of composition and structure of shark teeth. *Engineering of Biomaterials*, *16*.

523. Qian, X., Cao, Y., Zhang, J., Raabe, D., Yao, Z., & Fei, B. (2008). An inverse approach to determine the mechanical properties of elastoplastic materials using indentation tests. *Cmc-Computers Materials & Continua*, *7*(1), 33–41.

524. Raabe, D. (1994a). Modelling of grain rotations during compression deformation of polycrystalline intermetallic L12 compounds. *Materials Science and Engineering: A*, *186*(1–2), L1–L3.

525. Raabe, D. (1994b). Modelling of texture evolution during rolling and compression deformation of intermetallic Ni3Al and NiAl polycrystals. *Computational Materials Science*, *3*(2), 231–240.

526. Raabe, D. (1994c). Simulation of texture evolution during rolling deformation of an intermetallic Fe-28Al-5Cr polycrystal. *Materials Letters*, *19*(1–2), 75–78.

527. Raabe, D. (1995a). Contribution of {123} 〈111〉 slip systems to deformation of b.c.c. metals. *Physica Status Solidi (a)*, *149*(2), 575–581. https://doi.org/10.1002/pssa.2211490208

528. Raabe, D. (1995b). Experimental investigation and simulation of crystallographic rolling textures of Fe–11Cr steel. *Materials Science and Technology*, *11*(10), 985–993.

529. Raabe, D. (1995c). Inhomogeneity of the crystallographic texture in a hot-rolled austenitic stainless steel. *Journal of Materials Science*, *30*(1), 47–52. https://doi.org/10.1007/BF00352130

530. Raabe, D. (1995d). Investigation of contribution of {123} slip planes to development of rolling textures in bee metals by use of Taylor models. *Materials Science and Technology*, *11*(5), 455–460. https://doi.org/10.1179/mst.1995.11.5.455

531. Raabe, D. (1995e). Investigation of the iterative series expansion method by means of standard functions. *Materials Letters*, *22*(5–6), 313–318. https://doi.org/10.1016/0167-577X(94)00252-5

532. Raabe, D. (1995f). Investigation of the orientation dependence of recovery in low-carbon steel by use of single orientation determination. *Steel Research*, *66*(5), 222–229.

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 53 of 87

533. Raabe, D. (1995g). Microstructure and crystallographic texture of strip-cast and hot-rolled austenitic stainless steel. *Metallurgical and Materials Transactions A*, *26*(4), 991–998. https://doi.org/10.1007/BF02649096

534. Raabe, D. (1995h). Modelling of active slip systems, Taylor factors and grain rotations during rolling and compression deformation of polycrystalline intermetallic L12 compounds. *Acta Metallurgica et Materialia*, *43*(4), 1531–1540.

535. Raabe, D. (1995i). On the orientation dependence of static recovery in low-carbon steels. *Scripta Metallurgica et Materialia*, *33*(5).

536. Raabe, D. (1995j). Simulation of rolling textures of b.c.c. metals considering grain interactions and crystallographic slip on {110}, {112} and {123} planes. *Materials Science and Engineering A*, *197*(1), 31–37. https://doi.org/10.1016/0921-5093(94)09770-4

537. Raabe, D. (1995k). Simulation of the resistivity of heavily cold worked Cu-20 wt.% Nb wires. *Computational Materials Science*, *3*(3), 402–412. https://doi.org/10.1016/0927-0256(94)00079-R

538. Raabe, D. (1995l). Texture simulation for hot rolling of aluminium by use of a Taylor model considering grain interactions. *Acta Metallurgica Et Materialia*, *43*(3), 1023–1028. https://doi.org/10.1016/0956-7151(94)00302-X

539. Raabe, D. (1995m). Textures of strip cast and hot rolled ferritic and austenitic stainless steel. *Materials Science and Technology (United Kingdom)*, *11*(5), 461–468. https://doi.org/10.1179/mst.1995.11.5.461

540. Raabe, D. (1996a). On the contribution of screw dislocations to internal stress fields associated with dislocation cell structures. *Philosophical Magazine A*, *73*(5), 1363–1383. https://doi.org/10.1080/01418619608245139

541. Raabe, D. (1996b). On the influence of the chromium content on the evolution of rolling textures in ferritic stainless steels. *Journal of Materials Science*, *31*(14), 3839–3845. https://doi.org/10.1007/BF00352800

542. Raabe, D. (1996c). Simulation of Dislocation Statics by Using 3D Field Equations for Dislocation Segments in Anisotropic Media/Simulation der Versetzungsstatik mit dreidimensionalen Feldgleichungen für Versetzungssegmente in anisotropen Medien. *International Journal of Materials Research*, *87*(6), 493–497.

543. Raabe, D. (1996d). Taylor simulation and experimental investigation of rolling textures of polycrystalline iron aluminides with special regard to slip on {112} planes. *Acta Materialia*, *44*(3), 937–951. https://doi.org/10.1016/1359-6454(95)00243-X

544. Raabe, D. (1997). Texture and microstructure evolution during cold rolling of a strip cast and of a hot rolled austenitic stainless steel. *Acta Materialia*, *45*(3), 1137–1151. https://doi.org/10.1016/S1359-6454(96)00222-4

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 54 of 87

545. Raabe, D. (1998a). Computational Materials Science. In *Computational Materials Science*. Wiley-VCH Verlag GmbH & Co. KGaA. https://doi.org/10.1002/3527601945

546. Raabe, D. (1998b). On the consideration of climb in discrete dislocation dynamics. *Philosophical Magazine A: Physics of Condensed Matter, Structure, Defects and Mechanical Properties*, *77*(3), 751–759. https://doi.org/10.1080/01418619808224081

547. Raabe, D. (1999). Introduction of a scalable three-dimensional cellular automaton with a probabilistic switching rule for the discrete mesoscale simulation of recrystallization phenomena. *Philosophical Magazine A: Physics of Condensed Matter, Structure, Defects and Mechanical Properties*, *79*(10), 2339–2358. https://doi.org/10.1080/01418619908214288

548. RAABE, D. (1999). Introductiori of a scalable three-dimensional cellular automato~, with a pr9babilistic sw. itcbing rule for tbe discrete mesoscale simulation of recrystaßiza~ iQn. pbenomena·'. *Philosophical Magazine A*, *79*(10), 2339–2358.

549. Raabe, D. (2000a). Scaling Monte Carlo kinetics of the potts model using rate theory. *Acta Materialia*, *48*(7), 1617–1628. https://doi.org/10.1016/S1359-6454(99)00451-6

550. Raabe, D. (2000b). Yield surface simulation for partially recrystallized aluminum polycrystals on the basis of spatially discrete data. *Computational Materials Science*, *19*(1–4), 13–26. https://doi.org/10.1016/s0927-0256(00)00135-x

551. Raabe, D. (2002a). Cellular Automata in Materials Science with Particular Reference to Recrystallization Simulation. *Annual Review of Materials Science*, *32*(1), 53–76. https://doi.org/10.1146/annurev.matsci.32.090601.152855

552. Raabe, D. (2002b). Challenges in computational materials science. *Advanced Materials*, *14*(9), 639–650. https://doi.org/10.1002/1521-4095(20020503)14:9<639::AID-ADMA639>3.0.CO;2-7

553. Raabe, D. (2002c). Don't trust your simulation - Computational materials science on its way to maturity? *Advanced Engineering Materials*, *4*(5), 255–267. https://doi.org/10.1002/1527-2648(20020503)4:5<255::AID-ADEM255>3.0.CO;2-R

554. Raabe, D. (2004a). Mesoscale simulation of spherulite growth during polymer crystallization by use of a cellular automaton. *Acta Materialia*, *52*(9), 2653–2664. https://doi.org/10.1016/j.actamat.2004.02.013

555. Raabe, D. (2004b). Overview of the lattice Boltzmann method for nano- And microscale fluid dynamics in materials science and engineering. *Modelling and Simulation in Materials Science and Engineering*, *12*(6), R13–R46. https://doi.org/10.1088/0965-0393/12/6/R01

556. Raabe, D. (2005). Recrystallization Simulation by Use of Cellular Automata. In *Handbook of Materials Modeling* (pp. 2173–2203). https://doi.org/10.1007/978-1-4020-3286-8_113

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 55 of 87

557. Raabe, D. (2006). A texture-component Avrami model for predicting recrystallization textures, kinetics and grain size. *Modelling and Simulation in Materials Science and Engineering*, *15*(2), 39. https://doi.org/10.1088/0965-0393/15/2/004

558. Raabe, D. (2023). The Materials Science behind Sustainable Metals and Alloys. *Chemical Reviews*, *123*(5), 2436–2608. https://doi.org/10.1021/acs.chemrev.2c00799

559. Raabe, D., Al-Sawalmih, A., Yi, S. B., & Fabritius, H. (2007). Preferred crystallographic texture of α-chitin as a microscopic and macroscopic design principle of the exoskeleton of the lobster Homarus americanus. *Acta Biomaterialia*, *3*(6), 882–895. https://doi.org/10.1016/j.actbio.2007.04.006

560. Raabe, D., Ball, J., & Gottstein, G. (1992). Rolling Textures of a Cu--20 Nb Composite. *Scripta Metallurgica et Materialia(USA)*, *27*(2), 211–216.

561. Raabe, D., Chen, N., & Chen, L. (2004). Crystallographic texture, amorphization, and recrystallization in rolled and heat treated polyethylene terephthalate (PET). *Polymer*, *45*(24), 8265–8277. https://doi.org/10.1016/j.polymer.2004.09.045

562. Raabe, D., Choi, P., Li, Y., Kostka, A., Sauvage, X., Lecouturier, F., Hono, K., Kirchheim, R., Pippan, R., & Embury, D. (2010a). *MRS_Bulletin-2010 Raabe Metals at extremes mechanical alloying*. *35*(December), 982–991.

563. Raabe, D., Choi, P. P., Li, Y., Kostka, A., Sauvage, X., Lecouturier, F., Hono, K., Kirchheim, R., Pippan, R., & Embury, D. (2010b). Metallic composites processed via extreme deformation: Toward the limits of strength in bulk materials. *MRS Bulletin*, *35*(12), 982–991. https://doi.org/10.1557/mrs2010.703

564. Raabe, D., Degenhardt, R., Seliger, R., Klos, W., Sachtleber, M., & Ernenputsch, L. (2008). Advances in the Optimization of Thin Strip Cast Austenitic 304 Stainless Steel. *Steel Research International*, *79*(6), 440–444. https://doi.org/10.1002/srin.200806150

565. Raabe, D., & Ge, J. (2004a). Experimental study on the thermal stability of Cr filaments in a Cu–Cr–Ag in situ composite. *Scripta Materialia*, *51*(9), 915–920.

566. Raabe, D., & Ge, J. (2004b). Experimental study on the thermal stability of Cr filaments in a Cu-Cr-Ag in situ composite. *Scripta Materialia*, *51*(9), 915–920. https://doi.org/10.1016/j.scriptamat.2004.06.016

567. Raabe, D., & Godara, A. (2005). Mesoscale simulation of the kinetics and topology of spherulite growth during crystallization of isotactic polypropylene (iPP) by using a cellular automaton. *Modelling and Simulation in Materials Science and Engineering*, *13*(5), 733. https://doi.org/10.1088/0965-0393/13/5/007

568. Raabe, D., & Hangen, U. (1995a). Introduction of a modified linear rule of mixtures for the modelling of the yield strength of heavily wire drawn in situ composites. *Composites Science and Technology*, *55*(1), 57–61. https://doi.org/10.1016/0266-3538(95)00094-1

569. Raabe, D., & Hangen, U. (1995b). Investigation of structurally less-ordered areas in the Nb filaments of a heavily cold-rolled Cu-20 wt. % Nb in situ composite. *Journal of Materials Research*, *10*(12), 3050–3061. https://doi.org/10.1557/JMR.1995.3050

570. Raabe, D., & Hangen, U. (1995c). Observation of amorphous areas in a heavily cold rolled Cu-20 wt% Nb composite. *Materials Letters*, *22*(3–4), 155–161. https://doi.org/10.1016/0167-577X(94)00248-7

571. Raabe, D., & Hangen, U. (1996a). Correlation of microstructure and type II superconductivity of a heavily cold rolled Cu-20mass% Nb in situ composite. *Acta Materialia*, *44*(3), 953–961. https://doi.org/10.1016/1359-6454(95)00239-1

572. Raabe, D., & Hangen, U. (1996b). On the anisotropy of the superconducting properties of a heavily cold rolled cu-20 mass% Nb in situ composite. *Physica Status Solidi (A) Applied Research*, *154*(2), 715–726. https://doi.org/10.1002/pssa.2211540224

573. Raabe, D., & Hangen, U. (1996c). Simulation of the yield strength of wire drawn Cu-based in-situ composites. *Computational Materials Science*, *5*(1–3), 195–202. https://doi.org/10.1016/0927-0256(95)00072-0

574. Raabe, D., Helming, K., Roters, F., Zhao, Z., & Hirsch, J. (2002). A texture component crystal plasticity finite element method for scalable large strain anisotropy simulations. *Materials Science Forum*, *408–412*(I), 257–262. https://doi.org/10.4028/www.scientific.net/msf.396-402.31

575. Raabe, D., Herbig, M., Sandlöbes, S., Li, Y., Tytko, D., Kuzmina, M., Ponge, D., & Choi, P. P. (2014). Grain boundary segregation engineering in metallic alloys: A pathway to the design of interfaces. *Current Opinion in Solid State and Materials Science*, *18*(4), 253–261. https://doi.org/10.1016/j.cossms.2014.06.002

576. Raabe, D., & Heringhaus, F. (1994). Correlation of superconductivity and microstructure in an in-situ formed Cu–20%Nb composite. *Physica Status Solidi (a)*, *142*(2), 473–481. https://doi.org/10.1002/pssa.2211420221

577. Raabe, D., Heringhaus, F., Hangen, U., & Gottstein, G. (1995a). Investigation of a Cu-20 mass% Nb in situ composite, part I: fabrication, microstructure and mechanical properties. *Zeitschrift Fur Metallkunde*, *86*(6), 405–415.

578. Raabe, D., Heringhaus, F., Hangen, U., & Gottstein, G. (1995b). Investigation of a Cu-20 mass% Nb in situ Composite, Part II: Electromagnetic Properties and Application. *Zeitschrift Fuer Metallkunde/Materials Research and Advanced Techniques Für Metallkunde*, *86*, 416.

579. Raabe, D., & Hessling, D. (2010). Synthesis of hollow metallic particles via ultrasonic treatment of a metal emulsion. *Scripta Materialia*, *62*(9), 690–692. https://doi.org/10.1016/j.scriptamat.2010.01.028

580. Raabe, D., & Keichel, J. (1995). Development of the microstructure and crystallographic texture during annealing of a rolled polycrystalline Fe3Al alloy. *Materials Science and Engineering A*, *203*(1–2), 208–216. https://doi.org/10.1016/0921-5093(95)09872-0

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 57 of 87

581. Raabe, D., & Keichel, J. (1996). On the inhomogeneity of the crystallographic rolling texture of polycrystalline Fe3Al. *Journal of Materials Research*, *11*(7), 1694–1701.

582. Raabe, D., Keichel, J., & Gottstein, G. (1997). Investigation of crystallographic slip in polycrystalline Fe3Al using slip trace measurement and microtexture determination. *Acta Materialia*, *45*(7), 2839–2849. https://doi.org/10.1016/S1359-6454(96)00373-4

583. Raabe, D., Keichel, J., & Sun, Z. (1996). Microstructure and crystallographic texture of rolled polycrystalline Fe3Al. *Journal of Materials Science*, *31*(2), 339–344. https://doi.org/10.1007/BF01139149

584. Raabe, D., Klose, P., Engl, B., Imlau, K. P., Friedel, F., & Roters, F. (2002). Concepts for integrating plastic anisotropy into metal forming simulations. *Advanced Engineering Materials*, *4*(4), 169–180. https://doi.org/10.1002/1527-2648(200204)4:4<169::AID-ADEM169>3.0.CO;2-G

585. Raabe, D., Li, Z., & Ponge, D. (2019). Metastability alloy design. *MRS Bulletin*, *44*(4), 266–272. https://doi.org/10.1557/mrs.2019.72

586. Raabe, D., & Lücke, K. (1992a). Influence of particles on recrystallization textures of ferritic stainless steels. *Steel Research*, *63*(10), 457–464.

587. Raabe, D., & Lücke, K. (1992b). Rolling and annealing textures of bcc metals. *Scripta Metallurgica et Materiala*, *27*(pt 1), 597–610. https://doi.org/10.4028/www.scientific.net/msf.157-162.597

588. Raabe, D., & Lücke, K. (1992c). Selective particle drag during primary recrystallization of Fe-Cr alloys. *Scripta Metallurgica et Materiala*, *26*(1), 19–24. https://doi.org/10.1016/0956-716X(92)90361-H

589. Raabe, D., & Lücke, K. (1993a). Investigation of the ADC Method for Direct ODF Approximation by Means of Standard Functions. *Physica Status Solidi (b)*, *180*(1), 59–65. https://doi.org/10.1002/pssb.2221800103

590. Raabe, D., & Lücke, K. (1993b). Textures of ferritic stainless steels. *Materials Science and Technology (United Kingdom)*, *9*(4), 302–312. https://doi.org/10.1179/mst.1993.9.4.302

591. Raabe, D., Lücke, K., Raahe, D., Licke, K., Raabe, D., & Lucke, K. (1994). Rolling textures of niobium and molybdenum. *Zeitschrift Für Metallkunde/Materials Research and Advanced Techniques*. *Metallkd*, *85*(5), 302–307. http://cat.inist.fr/?aModele=afficheN&cpsidt=4188559

592. Raabe, D., Ma, D., & Roters, F. (2007). Effects of initial orientation, sample geometry and friction on anisotropy and crystallographic orientation changes in single crystal microcompression deformation: A crystal plasticity finite element study. *Acta Materialia*, *55*(13), 4567–4583. https://doi.org/10.1016/j.actamat.2007.04.023

593. Raabe, D., & Mao, W. (1995). Experimental investigation and simulation of the texture evolution during rolling deformation of an intermetallic Fe-28 at.% A1–2

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 58 of 87

at.% Cr polycrystal at elevated temperatures. *Philosophical Magazine A*, *71*(4), 805–813. https://doi.org/10.1080/01418619508236221

594. Raabe, D., & Mattissen, D. (1998). Microstructure and mechanical properties of a cast and wire-drawn ternary Cu-Ag-Nb in situ composite. *Acta Materialia*, *46*(16), 5973–5984. https://doi.org/10.1016/S1359-6454(98)00218-3

595. Raabe, D., & Mattissen, D. (1999a). Experimental investigation and Ginzburg–Landau modeling of the microstructure dependence of superconductivity in Cu–Ag–Nb wires. *Acta Materialia*, *47*(3), 769–777.

596. Raabe, D., & Mattissen, D. (1999b). Experimental investigation and ginzburg-landau modeling of the microstructure dependence of superconductivity in Cu-Ag-Nb wires. *Acta Materialia*, *47*(3), 769–777. https://doi.org/10.1016/S1359-6454(98)00406-6

597. Raabe, D., Mianroodi, J. R., & Neugebauer, J. (2023). Accelerating the design of compositionally complex materials via physics-informed artificial intelligence. *Nature Computational Science*, *3*(March), 198–209. https://doi.org/10.1038/s43588-023-00412-7

598. Raabe, D., Miyake, K., & Takahara, H. (2000). Processing, microstructure, and properties of ternary high-strength Cu-Cr-Ag in situ composites. *Materials Science and Engineering A*, *291*(1), 186–197. https://doi.org/10.1016/S0921-5093(00)00981-3

599. Raabe, D., Ohsaki, S., & Hono, K. (2009). Mechanical alloying and amorphization in Cu-Nb-Ag in situ composite wires studied by transmission electron microscopy and atom probe tomography. *Acta Materialia*, *57*(17), 5254–5263. https://doi.org/10.1016/j.actamat.2009.07.028

600. Raabe, D., Ponge, D., Dmitrieva, O., & Sander, B. (2009). Designing ultrahigh strength steels with good ductility by combining transformation induced plasticity and martensite aging. *Advanced Engineering Materials*, *11*(7), 547–555. https://doi.org/10.1002/adem.200900061

601. Raabe, D., Ponge, D., Kirchheim, R., Assadi, H., Li, Y., Goto, S., Kostka, A., Herbig, M., Sandl, S., Kuzmina, M., Millán, J., Yuan, L., Choi, P. P., Sandlöbes, S., & Kuzmina, M. (2013). Interface segregation in advanced steels studied at the atomic scale. *Microstructural Design of Advanced Engineering Materials*, 267–298. https://doi.org/10.1002/9783527652815.ch11

602. Raabe, D., Ponge, D., Uggowitzer, P. J., Roscher, M., Paolantonio, M., Liu, C., Antrekowitsch, H., Kozeschnik, E., Seidmann, D., Gault, B., de Geuser, F., Deschamps, A., Hutchinson, C., Liu, C., Li, Z., Prangnell, P., Robson, J., Shanthraj, P., Vakili, S., … Pogatscher, S. (2022). Making sustainable aluminum by recycling scrap: The science of “dirty” alloys. *Progress in Materials Science*, *128*, 100947. https://doi.org/10.1016/j.pmatsci.2022.100947

603. Raabe, D., Ponge, D., Wang, M. M., Herbig, M., Belde, M., & Springer, H. (2017). 1 billion tons of nanostructure - Segregation engineering enables confined transformation effects at lattice defects in steels. *IOP Conference Series:*

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 59 of 87

Materials Science and Engineering, *219*(1). https://doi.org/10.1088/1757-899X/219/1/012006

604. Raabe, D., Reher, F., Hölscher, M., & Lücke, K. (1993). Textures of strip cast Fe16%Cr. *Scripta Metallurgica et Materiala*, *29*(1), 113–116. https://doi.org/10.1016/0956-716X(93)90264-S

605. Raabe, D., Rezaei Mianroodi, J., & Neugebauer, J. (2023). Computational design of compositionally complex materials. *Nature Computational Science*, *3*, 198–209. https://www.nature.com/articles/s43588-023-00412-7

606. Raabe, D., Romano, P., Sachs, C., Al-Sawalmih, A., Brokmeier, H. G., Yi, S. B., Servos, G., & Hartwig, H. G. (2005). Discovery of a honeycomb structure in the twisted plywood patterns of fibrous biological nanocomposite tissue. *Journal of Crystal Growth*, *283*(1–2), 1–7. https://doi.org/10.1016/j.jcrysgro.2005.05.077

607. Raabe, D., Romano, P., Sachs, C., Fabritius, H., Al-Sawalmih, A., Yi, S. B., Servos, G., & Hartwig, H. G. (2006). Microstructure and crystallographic texture of the chitin-protein network in the biological composite material of the exoskeleton of the lobster Homarus americanus. *Materials Science and Engineering A*, *421*(1–2), 143–153. https://doi.org/10.1016/j.msea.2005.09.115

608. Raabe, D., & Roters, F. (2004). Using texture components in crystal plasticity finite element simulations. *International Journal of Plasticity*, *20*(3), 339–361. https://doi.org/10.1016/S0749-6419(03)00092-5

609. Raabe, D., Roters, F., Barlat, F., & Chen, L.-Q. (2004). Continuum Scale Simulation of Engineering Materials. In *Continuum Scale Simulation of Engineering Materials*. John Wiley & Sons. https://doi.org/10.1002/3527603786

610. Raabe, D., Roters, F., & Gottstein, G. (1996). Simulation of the statics of 2D and 3D dislocation networks. *Computational Materials Science*, *5*(1–3), 203–209.

611. Raabe, D., Roters, F., Neugebauer, J., Gutierrez-Urrutia, I., Hickel, T., Bleck, W., Schneider, J. M., Wittig, J. E., & Mayer, J. (2016). Ab initio-guided design of twinning-induced plasticity steels. *MRS Bulletin*, *41*(4), 320–325. https://doi.org/10.1557/mrs.2016.63

612. Raabe, D., Sachs, C., & Romano, P. (2005). The crustacean exoskeleton as an example of a structurally and mechanically graded biological nanocomposite material. *Acta Materialia*, *53*(15), 4281–4292. https://doi.org/10.1016/j.actamat.2005.05.027

613. Raabe, D., Sachtleber, M., Vega, L. F., & Weiland, H. (2002). Surface micromechanics of polymer coated aluminium sheets during plastic deformation. *Advanced Engineering Materials*, *4*(11), 859–864. https://doi.org/10.1002/1527-2648

614. Raabe, D., Sachtleber, M., Weiland, H., Scheele, G., & Zhao, Z. (2003). Grain-scale micromechanics of polycrystal surfaces during plastic straining. *Acta Materialia*, *51*(6), 1539–1560. https://doi.org/10.1016/S1359-6454(02)00557-8

615. Raabe, D., Sachtleber, M., Zhao, Z., Roters, F., & Zaefferer, S. (2001). Micromechanical and macromechanical effects in grain scale polycrystal

plasticity experimentation and simulation. *Acta Materialia*, *49*(17), 3433–3441. https://doi.org/10.1016/S1359-6454(01)00242-7

616. Raabe, D., Sander, B., Friák, M., Ma, D., & Neugebauer, J. (2007). Theory-guided bottom-up design of β-titanium alloys as biomaterials based on first principles calculations: Theory and experiments. *Acta Materialia*, *55*(13), 4475–4487. https://doi.org/10.1016/j.actamat.2007.04.024

617. Raabe, D., Schlenkert, G., Weisshaupt, H., & Lücke, K. (1994). Texture and microstructure of rolled and annealed tantalum. *Materials Science and Technology (United Kingdom)*, *10*(4), 299–305. https://doi.org/10.1179/mst.1994.10.4.299

618. Raabe, D., Sun, B., Kwiatkowski Da Silva, A., Gault, B., Yen, H. W., Sedighiani, K., Thoudden Sukumar, P., Souza Filho, I. R., Katnagallu, S., Jägle, E., Kürnsteiner, P., Kusampudi, N., Stephenson, L., Herbig, M., Liebscher, C. H., Springer, H., Zaefferer, S., Shah, V., Wong, S. L., … Ponge, D. (2020). Current Challenges and Opportunities in Microstructure-Related Properties of Advanced High-Strength Steels. *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, *51*(11), 5517–5586. https://doi.org/10.1007/s11661-020-05947-2

619. Raabe, D., Tasan, C. C., & Olivetti, E. A. (2019). Strategies for improving the sustainability of structural metals. *Nature*, *575*(7781), 64–74. https://doi.org/10.1038/s41586-019-1702-5

620. Raabe, D., Tasan, C. C., Springer, H., & Bausch, M. (2015). From high-entropy alloys to high-entropy steels. *Steel Research International*, *86*(10), 1127–1138. https://doi.org/10.1002/srin.201500133

621. Raabe, D., Wang, Y., & Roters, F. (2005). Crystal plasticity simulation study on the influence of texture on earing in steel. *Computational Materials Science*, *34*(3), 221–234. https://doi.org/10.1016/j.commatsci.2004.12.072

622. Raabe, D., & Ylitalo, M. (1996). Experimental investigation of the transformation texture in hotrolled ferritic stainless steel using single orientation determination. *Metallurgical and Materials Transactions A*, *27*(1), 49–57. https://doi.org/10.1007/BF02647746

623. Raabe, D., Zhao, Z., & Mao, W. (2002). On the dependence of in-grain subdivision and deformation texture of aluminum on grain interaction. *Acta Materialia*, *50*(17), 4379–4394. https://doi.org/10.1016/S1359-6454(02)00276-8

624. Raabe, D., Zhao, Z., & Roters, F. (2004). Study on the orientational stability of cube-oriented FCC crystals under plane strain by use of a texture component crystal plasticity finite element method. *Scripta Materialia*, *50*(7), 1085–1090. https://doi.org/10.1016/j.scriptamat.2003.11.061

625. Ram, F., Li, Z., Zaefferer, S., Hafez Haghighat, S. M., Zhu, Z., Raabe, D., Reed, R. C., Haghighat, S. M. H., Zhu, Z., Raabe, D., & Reed, R. C. (2016). On the origin of creep dislocations in a Ni-base, single-crystal superalloy: an ECCI, EBSD, and dislocation dynamics-based study. *Acta Materialia*, *109*, 151–161. https://doi.org/10.1016/j.actamat.2016.02.038

626. Ram, F., Zaefferer, S., Jäpel, T., & Raabe, D. (2015). Error analysis of the crystal orientations and disorientations obtained by the classical electron backscatter diffraction technique. *Journal of Applied Crystallography*, *48*(3), 797–813.

627. Ram, F., Zaefferer, S., & Raabe, D. (2014). Kikuchi bandlet method for the accurate deconvolution and localization of Kikuchi bands in Kikuchi diffraction patterns. *Journal of Applied Crystallography*, *47*(1), 264–275.

628. Rao, Z., Çakır, A., Özgün, Ö., Ponge, D., Raabe, D., Li, Z., & Acet, M. (2021). 3 d transition-metal high-entropy Invar alloy developed by adjusting the valence-electron concentration. *Physical Review Materials*, *5*(4), 44406.

629. Rao, Z., Dutta, B., Körmann, F., Lu, W., Zhou, X., Liu, C., da Silva, A. K., Wiedwald, U., Spasova, M., & Farle, M. (2021). Beyond Solid Solution High-Entropy Alloys: Tailoring Magnetic Properties via Spinodal Decomposition. *Advanced Functional Materials*, *31*(7), 2007668.

630. Rao, Z., Dutta, B., Körmann, F., Ponge, D., Li, L., He, J., Stephenson, L., Schäfer, L., Skokov, K., & Gutfleisch, O. (2020). Unveiling the mechanism of abnormal magnetic behavior of FeNiCoMnCu high-entropy alloys through a joint experimental-theoretical study. *Physical Review Materials*, *4*(1), 14402.

631. Rao, Z., Ponge, D., Körmann, F., Ikeda, Y., Schneeweiss, O., Friák, M., Neugebauer, J., Raabe, D., & Li, Z. (2019). Invar effects in FeNiCo medium entropy alloys: From an Invar treasure map to alloy design. *Intermetallics*, *111*(May), 106520. https://doi.org/10.1016/j.intermet.2019.106520

632. Rao, Z., Tung, P., Xie, R., Wei, Y., Zhang, H., Ferrari, A., Klaver, T. P. C., Körmann, F., Sukumar, P. T., da Silva, A. K., Chen, Y., Li, Z., Ponge, D., Neugebauer, J., Gutfleisch, O., Bauer, S., & Raabe, D. (2022). Machine learning-enabled high-entropy alloy discovery. *Science*, *85*(October), 78–85. https://doi.org/10.1126/science.abo4940

633. Rapp, B. (2006). Materials for extreme environments. Defense, aviation, and space agencies are beginning to look at the advanced composite materials necessary for hypersonic speeds. In *Materials Today* (Vol. 9, Issue 5, p. 6). https://doi.org/10.1016/S1369-7021(06)71471-7

634. Ratanaphan, S., Raabe, D., Sarochawikasit, R., Olmsted, D. L., Rohrer, G. S., & Tu, K.-N. (2017). Grain boundary character distribution in electroplated nanotwinned copper. *Journal of Materials Science*, *52*(7), 4070–4085.

635. Raters, F., & Raabe, D. (1996). Numerical simulation of stress fields of dislocation networks with special regard to interface dislocations. *Materials Science and Technology*, *12*(4), 281–289.

636. Raue, L., Klein, H., & Raabe, D. (2010). The exoskeleton of the American lobster-From texture to anisotropic properties. *Solid State Phenomena*, *160*(5), 287–294. https://doi.org/10.4028/www.scientific.net/SSP.160.287

637. Ravi Kumar, B., Raabe, D., Kumar, B. R., & Raabe, D. (2012). Tensile deformation characteristics of bulk ultrafine-grained austenitic stainless steel produced by thermal cycling. *Scripta Materialia*, *66*(9), 634–637. https://doi.org/10.1016/j.scriptamat.2012.01.052

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 62 of 87

638. Renner, F. U., Ankah, G. N., Bashir, A., Ma, D., Biedermann, P. U., Shrestha, B. R., Nellessen, M., Khorashadizadeh, A., Losada-Pérez, P., Duarte, M. J., Losada-Pérez, P., Duarte, M. J., Raabe, D., & Valtiner, M. (2015). Star-Shaped Crystallographic Cracking of Localized Nanoporous Defects. *Advanced Materials*, *27*(33), 4877–4882. https://doi.org/10.1002/adma.201405565

639. Renzetti, R. A., Sandim, H. R. Z., Padilha, A. F., Raabe, D., Lindau, R., & Möslang, A. (2011). Annealing Effects on the Microstructure of Ferritic-Martensitic ODS-Eurofer Steel. *Fusion Science and Technology*, *60*(1T), 22–26.

640. Renzetti, R. A., Sandim, H. R. Z., Sandim, M. J. R., Santos, A. D., Möslang, A., & Raabe, D. (2011). Annealing effects on microstructure and coercive field of ferritic-martensitic ODS Eurofer steel. *Materials Science and Engineering A*, *528*(3), 1442–1447. https://doi.org/10.1016/j.msea.2010.10.051

641. Reuber, C., Eisenlohr, P., Roters, F., & Raabe, D. (2014). Dislocation density distribution around an indent in single-crystalline nickel: Comparing nonlocal crystal plasticity finite-element predictions with experiments. *Acta Materialia*, *71*, 333–348. https://doi.org/10.1016/j.actamat.2014.03.012

642. Ristig, S., Prymak, O., Loza, K., Gocyla, M., Meyer-Zaika, W., Heggen, M., Raabe, D., & Epple, M. (2015). Nanostructure of wet-chemically prepared, polymer-stabilized silver–gold nanoalloys (6 nm) over the entire composition range. *Journal of Materials Chemistry B*, *3*(23), 4654–4662.

643. Rollett, A. D., & Raabe, D. (2001). A hybrid model for mesoscopic simulation of recrystallization. *Computational Materials Science*, *21*(1), 69–78. https://doi.org/10.1016/S0927-0256(00)00216-0

644. Romano, P., Fabritius, H., & Raabe, D. (2007). The exoskeleton of the lobster Homarus americanus as an example of a smart anisotropic biological material. *Acta Biomaterialia*, *3*(3 SPEC. ISS.), 301–309. https://doi.org/10.1016/j.actbio.2006.10.003

645. Roters, F., Diehl, M., Shanthraj, P., Eisenlohr, P., Reuber, C., Wong, S. L., Maiti, T., Ebrahimi, A., Hochrainer, T., Fabritius, H. O., Nikolov, S., Friák, M., Fujita, N., Grilli, N., Janssens, K. G. F., Jia, N., Kok, P. J. J., Ma, D., Meier, F., … Raabe, D. (2019). DAMASK – The Düsseldorf Advanced Material Simulation Kit for modeling multi-physics crystal plasticity, thermal, and damage phenomena from the single crystal up to the component scale. *Computational Materials Science*, *158*(January), 420–478. https://doi.org/10.1016/j.commatsci.2018.04.030

646. Roters, F., Eisenlohr, P., Bieler, T. R., & Raabe, D. (2011). Crystal plasticity finite element methods: in materials science and engineering. In *Crystal Plasticity Finite Element Methods: In Materials Science and Engineering*. John Wiley & Sons. https://doi.org/10.1002/9783527631483

647. Roters, F., Eisenlohr, P., Hantcherli, L., Tjahjanto, D. D., Bieler, T. R., & Raabe, D. (2010). Overview of constitutive laws, kinematics, homogenization and multiscale methods in crystal plasticity finite-element modeling: Theory,

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 63 of 87

experiments, applications. *Acta Materialia*, *58*(4), 1152–1211. https://doi.org/10.1016/j.actamat.2009.10.058

648. Roters, F., Eisenlohr, P., Kords, C., Tjahjanto, D. D., Diehl, M., & Raabe, D. (2012). DAMASK: The Düsseldorf advanced material simulation kit for studying crystal plasticity using an fe based or a spectral numerical solver. *Procedia IUTAM*, *3*, 3–10. https://doi.org/10.1016/j.piutam.2012.03.001

649. Roters, F., Raabe, D., & Gottstein, G. (1996). Calculation of stress—strain curves by using 2 dimensional dislocation dynamics. *Computational Materials Science*, *7*(1–2), 56–62.

650. Roters, F., Raabe, D., & Gottstein, G. (2000). Work hardening in heterogeneous alloys - a microstructural approach based on three internal state variables. *Acta Materialia*, *48*(17), 4181–4189. https://doi.org/10.1016/S1359-6454(00)00289-5

651. Roters, F., Wang, Y., Kuo, J. J. C., & Raabe, D. (2004). Comparison of single crystal simple shear deformation experiments with crystal plasticity finite element simulations. *Advanced Engineering Materials*, *6*(8), 653–656. https://doi.org/10.1002/adem.200400079

652. Rusitzka, K. A. K., Stephenson, L. T., Szczepaniak, A., Gremer, L., Raabe, D., Willbold, D., & Gault, B. (2018). A near atomic-scale view at the composition of amyloid-beta fibrils by atom probe tomography. *Scientific Reports*, *8*(1). https://doi.org/10.1038/s41598-018-36110-y

653. Sachs, C., Fabritius, H., & Raabe, D. (2006a). Experimental investigation of the elastic-plastic deformation of mineralized lobster cuticle by digital image correlation. *Journal of Structural Biology*, *155*(3), 409–425. https://doi.org/10.1016/j.jsb.2006.06.004

654. Sachs, C., Fabritius, H., & Raabe, D. (2006b). Hardness and elastic properties of dehydrated cuticle from the lobster Homarus americanus obtained by nanoindentation. *Journal of Materials Research*, *21*(8), 1987–1995. https://doi.org/10.1557/jmr.2006.0241

655. Sachs, C., Fabritius, H., & Raabe, D. (2008). Influence of microstructure on deformation anisotropy of mineralized cuticle from the lobster Homarus americanus. *Journal of Structural Biology*, *161*(2), 120–132. https://doi.org/10.1016/j.jsb.2007.09.022

656. Sachtleber, M., Raabe, D., & Weiland, H. (2004). Surface roughening and color changes of coated aluminum sheets during plastic straining. *Journal of Materials Processing Technology*, *148*(1), 68–76. https://doi.org/10.1016/j.jmatprotec.2004.01.041

657. Sachtleber, M., Zhao, Z., & Raabe, D. (2002). Experimental investigation of plastic grain interaction. *Materials Science and Engineering A*, *336*(1–2), 81–87. https://doi.org/10.1016/S0921-5093(01)01974-8

658. Sander, B., & Raabe, D. (2008). Texture inhomogeneity in a Ti-Nb-based β-titanium alloy after warm rolling and recrystallization. *Materials Science and Engineering A*, *479*(1–2), 236–247. https://doi.org/10.1016/j.msea.2007.06.077

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 64 of 87

659. Sandim, H. R. Z., Bernardi, H. H., Verlinden, B., & Raabe, D. (2007). Equal channel angular extrusion of niobium single crystals. *Materials Science and Engineering: A*, *467*(1–2), 44–52.

660. Sandim, H. R. Z. R. Z., Bolmaro, R. E., Renzetti, R. A., Sandim, M. J. R. J. R., Hartwig, K. T., Vogel, S. C., & Raabe, D. (2014). Texture Evolution as Determined by In situ Neutron Diffraction During Annealing of Iron Deformed by Equal Channel Angular Pressing. *Metallurgical and Materials Transactions A*, *45*(10), 4235–4246. https://doi.org/10.1007/s11661-014-2401-3

661. Sandim, H. R. Z., Renzetti, R. A., Padilha, A. F., Raabe, D., Klimenkov, M., Lindau, R., & Möslang, A. (2010a). Annealing behavior of ferritic–martensitic 9% Cr–ODS–Eurofer steel. *Materials Science and Engineering: A*, *527*(15), 3602–3608.

662. Sandim, H. R. Z., Renzetti, R. A., Padilha, A. F., Raabe, D., Klimenkov, M., Lindau, R., & Möslang, A. (2010b). Annealing behavior of ferritic-martensitic 9%Cr-ODS-Eurofer steel. *Materials Science and Engineering A*, *527*(15), 3602–3608. https://doi.org/10.1016/j.msea.2010.02.051

663. Sandim, H. R. Z., Sandim, M. J. R., Bernardi, H. H., Lins, J. F. C., & Raabe, D. (2004a). Annealing effects on the microstructure and texture of a multifilamentary Cu–Nb composite wire. *Scripta Materialia*, *51*(11), 1099–1104.

664. Sandim, H. R. Z., Sandim, M. J. R., Bernardi, H. H., Lins, J. F. C., & Raabe, D. (2004b). Annealing effects on the microstructure and texture of a multifilamentary Cu-Nb composite wire. *Scripta Materialia*, *51*(11), 1099–1104. https://doi.org/10.1016/j.scriptamat.2004.07.026

665. Sandim, H. R. Z. Z., Hayama, A. O. F. F., & Raabe, D. (2006). Recrystallization of the ODS superalloy PM-1000. *Materials Science and Engineering: A*, *430*(1–2), 172–178. https://doi.org/10.1016/j.msea.2006.05.110

666. Sandim, H. R. Z. Z., & Raabe, D. (2005). EBSD study of grain subdivision of a Goss grain in coarse-grained cold-rolled niobium. *Scripta Materialia*, *53*(2), 207–212. https://doi.org/10.1016/j.scriptamat.2005.03.045

667. Sandim, H. R. Z. Z., Renzetti, R. A., Padilha, A. F., Möslang, A., Lindau, R., & Raabe, D. (2012). Annealing behavior of RAFM ODS-Eurofer steel. *Fusion Science and Technology*, *61*(2), 136–140. https://doi.org/10.13182/FST12-A13379

668. Sandim, M. J. R. R., Stamopoulos, D., Aristomenopoulou, E., Zaefferer, S., Raabe, D., Awaji, S., & Watanabe, K. (2012). Grain structure and irreversibility line of a bronze route CuNb reinforced Nb3Sn multifilamentary wire. *Physics Procedia*, *36*, 1504–1509. https://doi.org/10.1016/j.phpro.2012.06.122

669. Sandim, M. J. R. R., Stamopoulos, D., Sandim, H. R. Z. Z., Ghivelder, L., Thilly, L., Vidal, V., Lecouturier, F., & Raabe, D. (2006). Size effects on the magnetic properties of Cu–Nb nanofilamentary wires processed by severe plastic deformation. *Superconductor Science and Technology*, *19*(12), 1233. https://doi.org/10.1088/0953-2048/19/12/002

670. Sandim, M. J. R., Sandim, H. R. Z., Zaefferer, S., Raabe, D., Awaji, S., & Watanabe, K. (2010). Electron backscatter diffraction study of Nb3Sn superconducting multifilamentary wire. *Scripta Materialia*, *62*(2), 59–62.

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 65 of 87

671. Sandim, M. J. R., Souza Filho, I. R., Bredda, E. H., Kostka, A., Raabe, D., & Sandim, H. R. Z. (2017). Coarsening of Y-rich oxide particles in 9% Cr-ODS Eurofer steel annealed at 1350 C. *J. Nucl. Mater*, *484*, 283–287.

672. Sandim, M. J. R., Tytko, D., Kostka, A., Choi, P., Awaji, S., Watanabe, K., & Raabe, D. (2013). Grain boundary segregation in a bronze-route Nb3Sn superconducting wire studied by atom probe tomography. *Superconductor Science and Technology*, *26*(5), 2–8. https://doi.org/10.1088/0953-2048/26/5/055008

673. Sandlöbes, S., Friák, M., Korte-Kerzel, S., Pei, Z., Neugebauer, J., & Raabe, D. (2017). A rare-earth free magnesium alloy with improved intrinsic ductility. *Scientific Reports*, *7*(1), 1–8. https://doi.org/10.1038/s41598-017-10384-0

674. Sandlöbes, S., Friák, M., Neugebauer, J., & Raabe, D. (2013). Basal and non-basal dislocation slip in Mg–Y. *Materials Science and Engineering: A*, *576*, 61–68. https://doi.org/10.1016/j.msea.2013.03.006

675. Sandlöbes, S., Friák, M., Zaefferer, S., Dick, A., Yi, S., Letzig, D., Pei, Z., Zhu, L. F., Neugebauer, J., & Raabe, D. (2012). The relation between ductility and stacking fault energies in Mg and Mg-Y alloys. *Acta Materialia*, *60*(6–7), 3011–3021. https://doi.org/10.1016/j.actamat.2012.02.006

676. Sandlöbes, S., Korte-Kerzel, S., & Raabe, D. (2019). On the influence of the heat treatment on microstructure formation and mechanical properties of near-α Ti-Fe alloys. *Materials Science and Engineering A*, *748*(September 2018), 301–312. https://doi.org/10.1016/j.msea.2018.12.071

677. Sasidhar, K. N., Khanchandani, H., Zhang, S., da Silva, A. K., Scheu, C., Gault, B., Ponge, D., & Raabe, D. (2022). Understanding the Protective Ability of the Native Oxide on an Fe-13 at. % Cr Alloy at the Atomic Scale: A Combined Atom Probe and Electron Microscopy Study. *SSRN Electronic Journal*, *211*(October 2022), 110848. https://doi.org/10.2139/ssrn.4216517

678. Sasidhar, K. N., Siboni, N. H., Mianroodi, J. R., Rohwerder, M., Neugebauer, J., & Raabe, D. (2022). Deep learning framework for uncovering compositional and environmental contributions to pitting resistance in passivating alloys. *Npj Materials Degradation*, *6*(1). https://doi.org/10.1038/s41529-022-00281-x

679. Sasidhar, K. N., Siboni, N. H., Mianroodi, J. R., Rohwerder, M., Neugebauer, J., & Raabe, D. (2023). Enhancing corrosion-resistant alloy design through natural language processing and deep learning. *Science Advances*, *9*, 7992. https://doi.org/10.1126/sciadv.adg7992

680. Scharifi, E., Tasan, C. C., Hoefnagels, J. P. M., & Raabe, D. (2012). Microstructural analysis of strain rate sensitivity of dual-phase steel. *Materials Science Engineering (MSE) 2012*.

681. Schemmann, L., Zaefferer, S., Raabe, D., Friedel, F., & Mattissen, D. (2015). Alloying effects on microstructure formation of dual phase steels. *Acta Materialia*, *95*, 386–398. https://doi.org/10.1016/j.actamat.2015.05.005

682. Scherrer, B., Li, T., Tsyganok, A., Döbeli, M., Gupta, B., Malviya, K. D., Kasian, O., Maman, N., Gault, B., Grave, D. A., Mehlman, A., Visoly-Fisher, I., Raabe, D., Rothschild, A., Döbeli, M., Gupta, B., Malviya, K. D., Kasian, O., Maman, N., ...

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 66 of 87

Grave, D. A. (2019). Defect segregation and its effect on the photoelectrochemical properties of Ti-doped hematite photoanodes for solar water splitting. *Chemistry of Materials*, *32*(3), 1031–1040. https://doi.org/10.1021/acs.chemmater.9b03704

683. Scheunemann, L., Balzani, D., Brands, D., Schröder, J., & Raabe, D. (2013). Statistically similar RVE construction based on 3D dual-phase steel microstructures. *Research and Applications in Structural Engineering, Mechanics and Computation–Proceedings of the 5th International Conference on Structural Engineering, Mechanics and Computation, SEMC, CRC Press*, *411*, 416.

684. Schnabel, V., Jaya, B. N., Köhler, M., Music, D., Kirchlechner, C., Dehm, G., Raabe, D., & Schneider, J. M. (2016). Electronic hybridisation implications for the damage-tolerance of thin film metallic glasses. *Scientific Reports*, *6*(1), 1–12. https://doi.org/10.1038/srep36556

685. Schnabel, V., Köhler, M., Evertz, S., Gamcova, J., Bednarcik, J., Music, D., Raabe, D., & Schneider, J. M. (2016). Revealing the relationships between chemistry, topology and stiffness of ultrastrong Co-based metallic glass thin films: A combinatorial approach. *Acta Materialia*, *107*, 213–219. https://doi.org/10.1016/j.actamat.2016.01.060

686. Schnabel, V., Köhler, M., Music, D., Bednarcik, J., Clegg, W. J., Raabe, D., & Schneider, J. M. (2017). Ultra-stiff metallic glasses through bond energy density design. *Journal of Physics: Condensed Matter*, *29*(26), 265502. https://doi.org/10.1088/1361-648X/aa72cb

687. Schönhöbel, A. M., Madugundo, R., Barandiarán, J. M., Hadjipanayis, G. C., Palanisamy, D., Schwarz, T., Gault, B., Raabe, D., Skokov, K., Gutfleisch, O., Fischbacher, J., & Schrefl, T. (2020). Nanocrystalline Sm-based 1: 12 magnets. *Acta Materialia*, *200*, 652–658. https://doi.org/10.1016/j.actamat.2020.08.075

688. Schwan, M., Naikade, M., Raabe, D., & Ratke, L. (2015). From hard to rubber-like: mechanical properties of resorcinol–formaldehyde aerogels. *Journal of Materials Science*, *50*(16), 5482–5493. https://doi.org/10.1007/s10853-015-9094-x

689. Schwarz, T., Cojocaru-Mirédin, O., Choi, P., Mousel, M., Redinger, A., Siebentritt, S., & Raabe, D. (2013). Atom probe study of Cu2ZnSnSe4 thin-films prepared by co-evaporation and post-deposition annealing. *Applied Physics Letters*, *102*(4). https://doi.org/10.1063/1.4788815

690. Schwarz, T., Cojocaru-Mirédin, O., Choi, P., Mousel, M., Redinger, A., Siebentritt, S., & Raabe, D. (2015). Atom probe tomography study of internal interfaces in Cu2ZnSnSe4 thin-films. *Journal of Applied Physics*, *118*(9), 95302.

691. Schwarz, T., Cojocaru-Mirédin, O., Mousel, M., Redinger, A., Raabe, D., & Choi, P. P. (2017). Formation of nanometer-sized Cu-Sn-Se particles in Cu2ZnSnSe4 thin-films and their effect on solar cell efficiency. *Acta Materialia*, *132*, 276–284. https://doi.org/10.1016/j.actamat.2017.04.056

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 67 of 87

692. Schwarz, T., Cojocaru-Mirédin, O., Raabe, D., Choi, P.-P., Marques, M. A. L., Botti, S., Mousel, M., Redinger, A., & Siebentritt, S. (2015). Detection of Cu {sub 2} Zn {sub 5} SnSe {sub 8} and Cu {sub 2} Zn {sub 6} SnSe {sub 9} phases in co-evaporated Cu {sub 2} ZnSnSe {sub 4} thin-films. *Applied Physics Letters*, *107*(17).

693. Schwarz, T., Marques, M. A. L. L., Botti, S., Mousel, M., Redinger, A., Siebentritt, S., Cojocaru-Mirédin, O., Raabe, D., & Choi, P.-P. P. (2015). Detection of Cu2Zn5SnSe8 and Cu2Zn6SnSe9 phases in co-evaporated Cu2ZnSnSe4 thin-films. *Applied Physics Letters*, *107*(17), 172102. https://doi.org/10.1063/1.4934847

694. Schwarz, T., Redinger, A., Siebentritt, S., Peng, Z., Gault, B., Raabe, D., & Choi, P.-P. (2019). Variable chemical decoration of extended defects in Cu-poor C u 2 ZnSnS e 4 thin films. *Physical Review Materials*, *3*(3), 35402.

695. Schwarz, T., Stechmann, G., Gault, B., Cojocaru-Mirédin, O., Wuerz, R., & Raabe, D. (2018). Correlative transmission Kikuchi diffraction and atom probe tomography study of Cu(In,Ga)Se 2 grain boundaries. *Progress in Photovoltaics: Research and Applications*, *26*(3), 196–204. https://doi.org/10.1002/pip.2966

696. Schweinar, K., Beeg, S., Hartwig, C., Rajamathi, C. R., Kasian, O., Piccinin, S., Prieto, M. J., Tanase, L. C., Gottlob, D. M., Schmidt, T., Raabe, D., Schlögl, R., Gault, B., Jones, T. E., & Greiner, M. T. (2020). Formation of a 2D Meta-stable Oxide by Differential Oxidation of AgCu Alloys. *ACS Applied Materials & Interfaces*, *12*(20), 23595–23605. https://doi.org/10.1021/acsami.0c03963

697. Schweinar, K., Nicholls, R. L., Rajamathi, C. R., Zeller, P., Amati, M., Gregoratti, L., Raabe, D., Greiner, M., Gault, B., & Kasian, O. (2020). Probing catalytic surfaces by correlative scanning photoemission electron microscopy and atom probe tomography. *Journal of Materials Chemistry A*, *8*(1), 388–400. https://doi.org/10.1039/c9ta10818a

698. Sedighiani, K., Diehl, M., Traka, K., Roters, F., Sietsma, J., & Raabe, D. (2020a). An efficient and robust approach to determine constitutive parameters of crystal plasticity laws from macro-scale stress-strain curves. *International Journal of Plasticity*.

699. Sedighiani, K., Diehl, M., Traka, K., Roters, F., Sietsma, J., & Raabe, D. (2020b). An efficient and robust approach to determine material parameters of crystal plasticity constitutive laws from macro-scale stress–strain curves. *International Journal of Plasticity*, *134*(June), 102779. https://doi.org/10.1016/j.ijplas.2020.102779

700. Sedighiani, K., Traka, K., Roters, F., Raabe, D., Sietsma, J., & Diehl, M. (2021). Determination and analysis of the constitutive parameters of temperature-dependent dislocation-density-based crystal plasticity models. *Mechanics of Materials*, *164*, 104117. https://doi.org/10.1016/j.mechmat.2021.104117

701. Sedighiani, K., Traka, K., Roters, F., Sietsma, J., Raabe, D., & Diehl, M. (2022). Crystal plasticity simulation of in-grain microstructural evolution during large

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 68 of 87

deformation of IF-steel. *Acta Materialia*, *237*, 118167. https://doi.org/10.1016/J.ACTAMAT.2022.118167

702. Semiatin, S. L., Fagin, P. N., Glavicic, M. G., & Raabe, D. (2004). Deformation behavior of Waspaloy at hot-working temperatures. *Scripta Materialia*, *50*(5), 625–629. https://doi.org/10.1016/j.scriptamat.2003.11.030

703. Seok, M.-Y., Gopalan, H., Nandy, S., Zaefferer, S., Raabe, D., Kirchlechner, C., & Dehm, G. (2020). Microscale plastic anisotropy of basal and pyramidal I slip in pure magnesium tested in shear. *Materialia*, *14*, 100932.

704. Seol, J. B., Bae, J. W., Li, Z., Chan Han, J., Kim, J. G., Raabe, D., & Kim, H. S. (2018). Boron doped ultrastrong and ductile high-entropy alloys. *Acta Materialia*, *151*, 366–376. https://doi.org/10.1016/j.actamat.2018.04.004

705. Seol, J. B., Na, S. H., Gault, B., Kim, J. E., Han, J. C., Park, C. G., & Raabe, D. (2017). Core-shell nanoparticle arrays double the strength of steel. *Scientific Reports*, *7*(January), 1–9. https://doi.org/10.1038/srep42547

706. Seol, J. B., Raabe, D., Choi, P. P., Im, Y. R., & Park, C. G. (2012). Atomic scale effects of alloying, partitioning, solute drag and austempering on the mechanical properties of high-carbon bainitic-austenitic TRIP steels. *Acta Materialia*, *60*(17), 6183–6199. https://doi.org/10.1016/j.actamat.2012.07.064

707. Seol, J. B., Raabe, D., Choi, P., Park, H. S., Kwak, J. H., & Park, C. G. (2013). Direct evidence for the formation of ordered carbides in a ferrite-based low-density Fe-Mn-Al-C alloy studied by transmission electron microscopy and atom probe tomography. *Scripta Materialia*, *68*(6), 348–353. https://doi.org/10.1016/j.scriptamat.2012.08.013

708. Shanthraj, P., Diehl, M., & Eisenlohr, P. (2019). Spectral Solvers for Crystal Plasticity and Multi-Physics Simulations Thermoelectrics View project CRC 1232 Farbige Zustände: High Throughput for Evolutionary Structural Materials View project. *Handbook of Mechanics of Materials*, 1–25. https://doi.org/10.1007/978-981-10-6855-3_80-3

709. Shanthraj, P., Diehl, M., Eisenlohr, P., Roters, F., Raabe, D., Chen, C. S., Chawla, K. K., Chawla, N., Chen, W., & Kagawa, Y. (2019). Spectral Solvers for Crystal Plasticity and Multi-physics Simulations. *Handbook of Mechanics of Materials, Springer, Berlin*, 978–981. https://doi.org/10.1007/978-981-10-6884-3_80

710. Shanthraj, P., Liu, C., Akbarian, A., Svendsen, B., & Raabe, D. (2020). Multi-component chemo-mechanics based on transport relations for the chemical potential. *Computer Methods in Applied Mechanics and Engineering*, *365*, 113029. https://doi.org/10.1016/j.cma.2020.113029

711. Shanthraj, P., Sharma, L., Svendsen, B., Roters, F., & Raabe, D. (2016). A phase field model for damage in elasto-viscoplastic materials. *Computer Methods in Applied Mechanics and Engineering*, *312*, 167–185. https://doi.org/10.1016/j.cma.2016.05.006

712. Shanthraj, P., Svendsen, B., Sharma, L., Roters, F., & Raabe, D. (2017). Elasto-viscoplastic phase field modelling of anisotropic cleavage fracture. *Journal of*

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 69 of 87

the Mechanics and Physics of Solids, *99*(November), 19–34. https://doi.org/10.1016/j.jmps.2016.10.012

713. Shen, Y. F., Jia, N., Wang, Y. D., Sun, X., Zuo, L., & Raabe, D. (2015). Suppression of twinning and phase transformation in an ultrafine grained 2 GPa strong metastable austenitic steel: Experiment and simulation. *Acta Materialia*, *97*, 305–315. https://doi.org/10.1016/j.actamat.2015.06.053

714. Shen, Y. F., Qiu, L. N., Sun, X., Zuo, L., Liaw, P. K., & Raabe, D. (2015). Effects of retained austenite volume fraction, morphology, and carbon content on strength and ductility of nanostructured TRIP-assisted steels. *Materials Science and Engineering: A*, *636*, 551–564.

715. Sheskin, A., Schwarz, T., Yu, Y., Zhang, S., Abdellaoui, L., Gault, B., Cojocaru-Mirédin, O., Scheu, C., Raabe, D., Wuttig, M., & Amouyal, Y. (2018). Tailoring Thermoelectric Transport Properties of Ag-Alloyed PbTe: Effects of Microstructure Evolution. *ACS Applied Materials and Interfaces*, *10*(45), 38994–39001. https://doi.org/10.1021/acsami.8b15204

716. Siboni, N. H., Raabe, D., & Varnik, F. (2013). Maintaining the equipartition theorem in small heterogeneous molecular dynamics ensembles. *Physical Review E*, *87*(3), 30101. https://doi.org/10.1103/PhysRevE.87.030101

717. Siboni, N. H., Raabe, D., & Varnik, F. (2015). Aging in amorphous solids: A study of the first-passage time and persistence time distributions. *EPL (Europhysics Letters)*, *111*(4), 48004. https://doi.org/10.1209/0295-5075/111/48004

718. Sohn, S. S., Kwiatkowski da Silva, A., Ikeda, Y., Körmann, F., Lu, W., Choi, W. S., Gault, B., Ponge, D., Neugebauer, J., & Raabe, D. (2019). Ultrastrong Medium-Entropy Single-Phase Alloys Designed via Severe Lattice Distortion. *Advanced Materials*, *31*(8), 1–8. https://doi.org/10.1002/adma.201807142

719. Soler, R., Evirgen, A., Yao, M., Kirchlechner, C., Stein, F., Feuerbacher, M., Raabe, D., & Dehm, G. (2018). Microstructural and mechanical characterization of an equiatomic YGdTbDyHo high entropy alloy with hexagonal close-packed structure. *Acta Materialia*, *156*, 86–96. https://doi.org/10.1016/j.actamat.2018.06.010

720. Song, J., Kostka, A., Veehmayer, M., & Raabe, D. (2011). Hierarchical microstructure of explosive joints: Example of titanium to steel cladding. *Materials Science and Engineering A*, *528*(6), 2641–2647. https://doi.org/10.1016/j.msea.2010.11.092

721. Song, R., Ponge, D., Kaspar, R., & Raabe, D. (2004). Grain boundary characterization and grain size measurement in an ultrafine-grained steel. *Zeitschrift Fuer Metallkunde/Materials Research and Advanced Techniques*, *95*(6), 513–517. https://doi.org/10.3139/146.017983

722. Song, R., Ponge, D., & Raabe, D. (2005a). Improvement of the work hardening rate of ultrafine grained steels through second phase particles. *Scripta Materialia*, *52*(11), 1075–1080. https://doi.org/10.1016/j.scriptamat.2005.02.016

723. Song, R., Ponge, D., & Raabe, D. (2005b). Influence of Mn content on the microstructure and mechanical properties of ultrafine grained C-Mn steels. *ISIJ*

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 70 of 87

International, *45*(11), 1721–1726. https://doi.org/10.2355/isijinternational.45.1721

724. Song, R., Ponge, D., & Raabe, D. (2005c). Mechanical properties of an ultrafine grained C-Mn steel processed by warm deformation and annealing. *Acta Materialia*, *53*(18), 4881–4892. https://doi.org/10.1016/j.actamat.2005.07.009

725. Song, R., Ponge, D., Raabe, D., & Kaspar, R. (2005). Microstructure and crystallographic texture of an ultrafine grained C-Mn steel and their evolution during warm deformation and annealing. *Acta Materialia*, *53*(3), 845–858. https://doi.org/10.1016/j.actamat.2004.10.051

726. Song, R., Ponge, D., Raabe, D., Speer, J. G., & Matlock, D. K. (2006). Overview of processing, microstructure and mechanical properties of ultrafine grained bcc steels. *Materials Science and Engineering A*, *441*(1–2), 1–17. https://doi.org/10.1016/j.msea.2006.08.095

727. Song, W., von Appen, J., Choi, P., Dronskowski, R., Raabe, D., & Bleck, W. (2013). Atomic-scale investigation of ε and θ precipitates in bainite in 100Cr6 bearing steel by atom probe tomography and ab initio calculations. *Acta Materialia*, *61*(20), 7582–7590. https://doi.org/10.1016/j.actamat.2013.08.051

728. Soni, P., Cojocaru-Miredin, O., & Raabe, D. (2015). Interface engineering and nanoscale characterization of Zn(S,O) alternative buffer layer for CIGS thin film solar cells. *2015 IEEE 42nd Photovoltaic Specialist Conference, PVSC 2015*, 1–5. https://doi.org/10.1109/PVSC.2015.7355889

729. Soni, P., Raghuwanshi, M., Wuerz, R., Berghoff, B., Knoch, J., Raabe, D., & Cojocaru-Mirédin, O. (2019a). Role of elemental intermixing at the In2S3/CIGSe heterojunction deposited using reactive RF magnetron sputtering. *Solar Energy Materials and Solar Cells*, *195*(January), 367–375. https://doi.org/10.1016/j.solmat.2019.03.026

730. Soni, P., Raghuwanshi, M., Wuerz, R., Berghoff, B., Knoch, J., Raabe, D., & Cojocaru-Mirédin, O. (2019b). Sputtering as a viable route for In2S3 buffer layer deposition in high efficiency Cu(In,Ga)Se2 solar cells. *Energy Science and Engineering*, *7*(2), 478–487. https://doi.org/10.1002/ese3.295

731. Soundararajan, C. K., Luo, H., Raabe, D., & Li, Z. (2020). Hydrogen resistance of a 1 GPa strong equiatomic CoCrNi medium entropy alloy. *Corrosion Science*, *167*, 108510.

732. Souza Filho, I. R. I. R., Dutta, A., Almeida Junior, D. R., Lu, W., Sandim, M. J. R. M. J. R., Ponge, D., Sandim, H. R. Z. H. R. Z., Raabe, D., Junior, D. R. A., Lu, W., Sandim, M. J. R. M. J. R., Ponge, D., Sandim, H. R. Z. H. R. Z., Raabe, D., Almeida Junior, D. R., Lu, W., Sandim, M. J. R. M. J. R., Ponge, D., Sandim, H. R. Z. H. R. Z., & Raabe, D. (2020). The impact of grain-scale strain localization on strain hardening of a high-Mn steel: Real-time tracking of the transition from the γ→ ε→ α'transformation to twinning. *Acta Materialia*, *197*, 123–136. https://doi.org/10.1016/j.actamat.2020.07.038

733. Souza Filho, I. R., Ma, Y., Kulse, M., Ponge, D., Gault, B., Springer, H., & Raabe, D. (2021). Sustainable steel through hydrogen plasma reduction of iron ore:

Process, kinetics, microstructure, chemistry. *Acta Materialia*, *213*, 116971. https://doi.org/10.1016/j.actamat.2021.116971

734. Souza Filho, I. R., Sandim, M. J. R., Cohen, R., Nagamine, L. C. C. M., Sandim, H. R. Z., & Raabe, D. (2019). Magnetic properties of a 17.6 Mn-TRIP steel: Study of strain-induced martensite formation, austenite reversion, and athermal α'-formation. *Journal of Magnetism and Magnetic Materials*, *473*(June 2018), 109–118. https://doi.org/10.1016/j.jmmm.2018.10.034

735. Souza Filho, I. R., Sandim, M. J. R. J. R., Ponge, D., Sandim, H. R. Z. R. Z., & Raabe, D. (2019). Strain hardening mechanisms during cold rolling of a high-Mn steel: Interplay between submicron defects and microtexture. *Materials Science and Engineering: A*, *754*(February), 636–649. https://doi.org/10.1016/j.msea.2019.03.116

736. Souza Filho, I. R., Springer, H., Ma, Y., Mahajan, A., da Silva, C. C., Kulse, M., & Raabe, D. (2022). Green steel at its crossroads: Hybrid hydrogen-based reduction of iron ores. *Journal of Cleaner Production*, *340*(January), 130805. https://doi.org/10.1016/j.jclepro.2022.130805

737. Springer, H., Aparicio Fernandez, R., Duarte, M. J., Kostka, A., & Raabe, D. (2015). Microstructure refinement for high modulus in-situ metal matrix composite steels via controlled solidification of the system Fe-TiB2. *Acta Materialia*, *96*, 47–56. https://doi.org/10.1016/j.actamat.2015.06.017

738. Springer, H., Baron, C., Szczepaniak, A., Jägle, E. A., Wilms, M. B., Weisheit, A., & Raabe, D. (2016). Efficient additive manufacturing production of oxide- and nitride-dispersion-strengthened materials through atmospheric reactions in liquid metal deposition. *Materials and Design*, *111*, 60–69. https://doi.org/10.1016/j.matdes.2016.08.084

739. Springer, H., Baron, C., Szczepaniak, A., Uhlenwinkel, V., & Raabe, D. (2017). Stiff, light, strong and ductile: nano-structured High Modulus Steel. *Scientific Reports*, *7*(1), 17–22. https://doi.org/10.1038/s41598-017-02861-3

740. Springer, H., Belde, M., & Raabe, D. (2013). Bulk combinatorial design of ductile martensitic stainless steels through confined martensite-to-austenite reversion. *Materials Science and Engineering: A*, *582*, 235–244. https://doi.org/10.1016/j.msea.2013.06.036

741. Springer, H., Belde, M., & Raabe, D. (2016). Combinatorial design of transitory constitution steels: Coupling high strength with inherent formability and weldability through sequenced austenite stability. *Materials and Design*, *90*, 1100–1109. https://doi.org/10.1016/j.matdes.2015.11.050

742. Springer, H., Kostka, A., dos Santos, J. F., & Raabe, D. (2011). Influence of intermetallic phases and Kirkendall-porosity on the mechanical properties of joints between steel and aluminium alloys. *Materials Science and Engineering A*, *528*(13–14), 4630–4642. https://doi.org/10.1016/j.msea.2011.02.057

743. Springer, H., Kostka, A., Payton, E. J., Raabe, D., Kaysser-Pyzalla, A., & Eggeler, G. (2011). On the formation and growth of intermetallic phases during

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 72 of 87

interdiffusion between low-carbon steel and aluminum alloys. *Acta Materialia*, *59*(4), 1586–1600. https://doi.org/10.1016/j.actamat.2010.11.023

744. Springer, H., Szczepaniak, A., & Raabe, D. (2015). On the role of zinc on the formation and growth of intermetallic phases during interdiffusion between steel and aluminium alloys. *Acta Materialia*, *96*, 203–211. https://doi.org/10.1016/j.actamat.2015.06.028

745. Springer, H., Tasan, C., & Raabe, D. (2015). A novel roll-bonding methodology for the cross-scale analysis of phase properties and interactions in multiphase structural materials. *International Journal of Materials Research*, *106*(1), 3–14. https://doi.org/10.3139/146.111156

746. Springer, H., Zhang, J. L., Szczepaniak, A., Belde, M., Gault, B., & Raabe, D. (2019). Light, strong and cost effective: Martensitic steels based on the Fe – Al – C system. *Materials Science and Engineering A*, *762*(May), 138088. https://doi.org/10.1016/j.msea.2019.138088

747. Stechmann, G., Zaefferer, S., Konijnenberg, P., Raabe, D., Gretener, C., Kranz, L., Perrenoud, J., Buecheler, S., & Tiwari, A. N. (2016). 3-Dimensional microstructural characterization of CdTe absorber layers from CdTe/CdS thin film solar cells. *Solar Energy Materials and Solar Cells*, *151*, 66–80. https://doi.org/10.1016/j.solmat.2016.02.023

748. Stechmann, G., Zaefferer, S., & Raabe, D. (2018). Molecular statics simulation of CdTe grain boundary structures and energetics using a bond-order potential. *Modelling and Simulation in Materials Science and Engineering*, *26*(4). https://doi.org/10.1088/1361-651X/aaba87

749. Stechmann, G., Zaefferer, S., Schwarz, T., Konijnenberg, P., Raabe, D., Gretener, C., Kranz, L., Perrenoud, J., Buecheler, S., Nath Tiwari, A., & Tiwari, A. N. (2017). A correlative investigation of grain boundary crystallography and electronic properties in CdTe thin film solar cells. *Solar Energy Materials and Solar Cells*, *166*(January), 108–120. https://doi.org/10.1016/j.solmat.2017.03.022

750. Steinmetz, D. R., Ja, T., Wietbrock, B., Eisenlohr, P., Jäpel, T., Wietbrock, B., Eisenlohr, P., Gutierrez-Urrutia, I., Saeed-Akbari, A., Hickel, T., Roters, F., & Raabe, D. (2013). Author ' s personal copy Revealing the strain-hardening behavior of twinning-induced plasticity steels : Theory , simulations , experiments. *Acta Materialia*, *61*(2), 494–510. https://doi.org/10.1016/j.actamat.2012.09.064

751. Stephenson, L. T., Szczepaniak, A., Mouton, I., Rusitzka, K. A. K. K., Breen, A. J., Tezins, U., Sturm, A., Vogel, D., Chang, Y., Kontis, P., Rosenthal, A., Shepard, J. D., Maier, U., Kelly, T. F., Raabe, D., & Gault, B. (2018). The Laplace Project: An integrated suite for preparing and transferring atom probe samples under cryogenic and UHV conditions. *Plos One*, *13*(12), e0209211. https://doi.org/10.1371/journal.pone.0209211

752. Stoffers, A., Barthel, J., Liebscher, C. H., Gault, B., Cojocaru-Mirédin, O., Scheu, C., & Raabe, D. (2017). Correlating atom probe tomography with atomic-resolved scanning transmission electron microscopy: Example of segregation

at silicon grain boundaries. *Microscopy and Microanalysis*, *23*(2), 291–299. https://doi.org/10.1017/S1431927617000034

753. Stoffers, A., Cojocaru-Mirédin, O., Seifert, W., Zaefferer, S., Riepe, S., & Raabe, D. (2015). Grain boundary segregation in multicrystalline silicon: correlative characterization by EBSD, EBIC, and atom probe tomography. *Progress in Photovoltaics: Research and Applications*, *23*(12), 1742–1753.

754. Stoffers, A., Ziebarth, B., Barthel, J., Cojocaru-Mirédin, O., Elsässer, C., & Raabe, D. (2015). Complex nanotwin substructure of an asymmetric Σ 9 tilt grain boundary in a silicon polycrystal. *Physical Review Letters*, *115*(23), 235502. https://doi.org/10.1103/PhysRevLett.115.235502

755. Storojeva, L., Ponge, D., Kaspar, R., & Raabe, D. (2004). Development of microstructure and texture of medium carbon steel during heavy warm deformation. *Acta Materialia*, *52*(8), 2209–2220. https://doi.org/10.1016/j.actamat.2004.01.024

756. Storojeva, L., Ponge, D., Raabe, D., & Kaspar, R. (2004). On the influence of heavy warm reduction on the microstructure and mechanical properties of a medium-carbon ferritic-pearlitic steel. *Zeitschrift Fuer Metallkunde/Materials Research and Advanced Techniques*, *95*(12), 1108–1114. https://doi.org/10.3139/146.018060

757. Su, J., Raabe, D., & Li, Z. (2019). Hierarchical microstructure design to tune the mechanical behavior of an interstitial TRIP-TWIP high-entropy alloy. *Acta Materialia*, *163*, 40–54. https://doi.org/10.1016/j.actamat.2018.10.017

758. Su, J., Wu, X., Raabe, D., & Li, Z. (2019). Deformation-driven bidirectional transformation promotes bulk nanostructure formation in a metastable interstitial high entropy alloy. *Acta Materialia*, *167*, 23–39. https://doi.org/10.1016/j.actamat.2019.01.030

759. Sulzer, S., Li, Z., Zaefferer, S., Hafez Haghighat, S. M., Wilkinson, A., Raabe, D., & Reed, R. (2020). On the assessment of creep damage evolution in nickel-based superalloys through correlative HR-EBSD and cECCI studies. *Acta Materialia*, *185*, 13–27. https://doi.org/10.1016/j.actamat.2019.07.018

760. Sun, B., Krieger, W., Rohwerder, M., Ponge, D., & Raabe, D. (2020). Dependence of hydrogen embrittlement mechanisms on microstructure-driven hydrogen distribution in medium Mn steels. *Acta Materialia*, *183*, 313–328. https://doi.org/10.1016/j.actamat.2019.11.029

761. Sun, B., Kwiatkowski, A., Wu, Y., Ma, Y., Chen, H., Scott, C., & Ponge, D. (2022). Physical metallurgy of medium-Mn advanced high-strength steels. *International Materials Reviews*, *0*(0), 1–39. https://doi.org/10.1080/09506608.2022.2153220

762. Sun, B., Lu, W., Gault, B., Ding, R., Makineni, S. K., Wan, D., Wu, C.-H. H., Chen, H., Ponge, D., & Raabe, D. (2021). Chemical heterogeneity enhances hydrogen resistance in high-strength steels. *Nature Materials*, *20*, 1629–1634. https://doi.org/10.1038/s41563-021-01050-y

763. Sun, B., Ma, Y., Vanderesse, N., Varanasi, R. S., Song, W., Bocher, P., Ponge, D., & Raabe, D. (2019). Macroscopic to nanoscopic in situ investigation on yielding

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 74 of 87

mechanisms in ultrafine grained medium Mn steels: Role of the austenite-ferrite interface. *Acta Materialia*, *178*, 10–25. https://doi.org/10.1016/j.actamat.2019.07.043

764. Sun, B., Palanisamy, D., Ponge, D., Gault, B., Fazeli, F., Scott, C., Yue, S., & Raabe, D. (2019). Revealing fracture mechanisms of medium manganese steels with and without delta-ferrite. *Acta Materialia*, *164*, 683–696. https://doi.org/10.1016/j.actamat.2018.11.029

765. Sun, D. K., Zhu, M. F., Dai, T., Cao, W. S., Chen, S. L., Raabe, D., & Hong, C. P. (2011). Modelling of dendritic growth in ternary alloy solidification with melt convection. *International Journal of Cast Metals Research*, *24*(3–4), 177–183. https://doi.org/10.1179/136404611X13001912813988

766. Sun, D. K., Zhu, M. F., Pan, S. Y., Yang, C. R., & Raabe, D. (2011). Lattice Boltzmann modeling of dendritic growth in forced and natural convection. *Computers & Mathematics with Applications*, *61*(12), 3585–3592. https://doi.org/10.1016/j.camwa.2010.11.001

767. Sun, D., Zhu, M., Pan, S., & Raabe, D. (2009a). Lattice Boltzmann modeling of dendritic growth in a forced melt convection. *Acta Materialia*, *57*(6), 1755–1767. https://doi.org/10.1016/j.actamat.2008.12.019

768. Sun, D., Zhu, M., Pan, S., & Raabe, D. (2009b). Numerical modeling of dendritic growth in alloy solidification with forced convection. *International Journal of Modern Physics B*, *23*(06n07), 1609–1614.

769. Sun, Z., Ma, Y., Ponge, D., Zaefferer, S., Jägle, E. A., Gault, B., Rollett, A. D., & Raabe, D. (2022). Thermodynamics-guided alloy and process design for additive manufacturing. *Nature Communications*, *13*(1). https://doi.org/10.1038/s41467-022-31969-y

770. Svendsen, B., Shanthraj, P., & Raabe, D. (2018). Finite-deformation phase-field chemomechanics for multiphase, multicomponent solids. *Journal of the Mechanics and Physics of Solids*, *112*, 619–636. https://doi.org/10.1016/j.jmps.2017.10.005

771. Swadener, J. G., Bögershausen, H., Sander, B., & Raabe, D. (2010). Crystal orientation effects in scratch testing with a spherical indenter. *Journal of Materials Research*, *25*(5), 921–926. https://doi.org/10.1557/jmr.2010.0108

772. Szczepaniak, A., Fan, J., Kostka, A., & Raabe, D. (2012a). On the Correlation Between Thermal Cycle and Formation of Intermetallic Phases at the Interface of Laser-Welded Aluminum-Steel Overlap Joints. *Advanced Engineering Materials*, *14*(7), 464–472.

773. Szczepaniak, A., Fan, J., Kostka, A., & Raabe, D. (2012b). On the correlation between thermal cycle and formation of intermetallic phases at the interface of laser-welded aluminum-steel overlap joints. *Advanced Engineering Materials*, *14*(7), 464–472. https://doi.org/10.1002/adem.201200075

774. Szczepaniak, A., Springer, H., Aparicio-Fernández, R., Baron, C., & Raabe, D. (2017a). Strengthening Fe – TiB2 based high modulus steels by precipitations.

Materials and Design, *124*, 183–193. https://doi.org/10.1016/j.matdes.2017.03.042

775. Szczepaniak, A., Springer, H., Aparicio-Fernández, R., Baron, C., & Raabe, D. (2017b). Strengthening Fe–TiB2 based high modulus steels by precipitations. *Materials & Design*, *124*, 183–193.

776. Takahashi, J., Kawakami, K., & Raabe, D. (2017). Comparison of the quantitative analysis performance between pulsed voltage atom probe and pulsed laser atom probe. *Ultramicroscopy*, *175*, 105–110. https://doi.org/10.1016/j.ultramic.2017.01.015

777. Takahashi, T., Ponge, D., & Raabe, D. (2007). Investigation of orientation gradients in pearlite in hypoeutectoid steel by use of orientation imaging microscopy. *Steel Research International*, *78*(1), 38–44. https://doi.org/10.1002/srin.200705857

778. Tan, X. D., Xu, Y. B., Ponge, D., Yang, X. L., Hu, Z. P., Peng, F., Ju, X. W., Wu, D., & Raabe, D. (2016). Effect of intercritical deformation on microstructure and mechanical properties of a low-silicon aluminum-added hot-rolled directly quenched and partitioned steel. *Materials Science and Engineering A*, *656*, 200–215. https://doi.org/10.1016/j.msea.2016.01.040

779. Tan, X., Ponge, D., Lu, W., Xu, Y., He, H., Yan, J., Wu, D., & Raabe, D. (2020). Joint investigation of strain partitioning and chemical partitioning in ferrite-containing TRIP-assisted steels. *Acta Materialia*, *186*, 374–388. https://doi.org/10.1016/j.actamat.2019.12.050

780. Tan, X., Ponge, D., Lu, W., Xu, Y., Yang, X., Rao, X., Wu, D., & Raabe, D. (2019). Carbon and strain partitioning in a quenched and partitioned steel containing ferrite. *Acta Materialia*, *165*, 561–576. https://doi.org/10.1016/j.actamat.2018.12.019

781. Tang, S., Wang, J. C., Svendsen, B., & Raabe, D. (2017). Competitive bcc and fcc crystal nucleation from non-equilibrium liquids studied by phase-field crystal simulation. *Acta Materialia*, *139*, 196–204. https://doi.org/10.1016/j.actamat.2017.08.015

782. Tarzimoghadam, Z., Ponge, D., Klöwer, J., & Raabe, D. (2017). Hydrogen-assisted failure in Ni-based superalloy 718 studied under in situ hydrogen charging: The role of localized deformation in crack propagation. *Acta Materialia*, *128*, 365–374. https://doi.org/10.1016/j.actamat.2017.02.059

783. Tarzimoghadam, Z., Rohwerder, M., Merzlikin, S. v., Bashir, A., Yedra, L., Eswara, S., Ponge, D., & Raabe, D. (2016). Multi-scale and spatially resolved hydrogen mapping in a Ni-Nb model alloy reveals the role of the δ phase in hydrogen embrittlement of alloy 718. *Acta Materialia*, *109*, 69–81. https://doi.org/10.1016/j.actamat.2016.02.053

784. Tarzimoghadam, Z., Sandlöbes, S., Pradeep, K. G., & Raabe, D. (2015). Microstructure design and mechanical properties in a near-α Ti-4Mo alloy. *Acta Materialia*, *97*, 291–304. https://doi.org/10.1016/j.actamat.2015.06.043

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 76 of 87

785. Tasan, C. C. C., Hoefnagels, J. P. M. P. M., Diehl, M., Yan, D., Roters, F., & Raabe, D. (2014). Strain localization and damage in dual phase steels investigated by coupled in-situ deformation experiments and crystal plasticity simulations. *International Journal of Plasticity*, *63*, 198–210. https://doi.org/10.1016/j.ijplas.2014.06.004

786. Tasan, C. C., Deng, Y., Pradeep, K. G., Yao, M. J., Springer, H., & Raabe, D. (2014). Composition Dependence of Phase Stability, Deformation Mechanisms, and Mechanical Properties of the CoCrFeMnNi High-Entropy Alloy System. *JOM*, *66*(10), 1993–2001. https://doi.org/10.1007/s11837-014-1133-6

787. Tasan, C. C., Diehl, M., Yan, D., Bechtold, M., Roters, F., Schemmann, L., Zheng, C., Peranio, N., Ponge, D., Koyama, M., Tsuzaki, K., & Raabe, D. (2015). An Overview of Dual-Phase Steels: Advances in Microstructure-Oriented Processing and Micromechanically Guided Design. *Annual Review of Materials Research*, *45*(1), 391–431. https://doi.org/10.1146/annurev-matsci-070214-021103

788. Tasan, C. C., Diehl, M., Yan, D., Zambaldi, C., Shanthraj, P., Roters, F., & Raabe, D. (2014). Integrated experimental-simulation analysis of stress and strain partitioning in multiphase alloys. *Acta Materialia*, *81*, 386–400. https://doi.org/10.1016/j.actamat.2014.07.071

789. Thomas, I., Zaefferer, S., Friedel, F., & Raabe, D. (2003). High-Resolution EBSD Investigation of Deformed and Partially Recrystallized IF Steel. *Advanced Engineering Materials*, *5*(8), 566–570. https://doi.org/10.1002/adem.200300373

790. Tikhovskiy, I., Raabe, D., & Roters, F. (2006). Simulation of the deformation texture of a 17%Cr ferritic stainless steel using the texture component crystal plasticity finite element method considering texture gradients. *Scripta Materialia*, *54*(8), 1537–1542. https://doi.org/10.1016/j.scriptamat.2005.12.038

791. Tikhovskiy, I., Raabe, D., & Roters, F. (2007). Simulation of earing during deep drawing of an Al-3% Mg alloy (AA 5754) using a texture component crystal plasticity FEM. *Journal of Materials Processing Technology*, *183*(2–3), 169–175. https://doi.org/10.1016/j.jmatprotec.2006.10.006

792. Tikhovskiy, I., Raabe, D., & Roters, F. (2008). Simulation of earing of a 17% Cr stainless steel considering texture gradients. *Materials Science and Engineering A*, *488*(1–2), 482–490. https://doi.org/10.1016/j.msea.2007.11.063

793. Timokhina, I. B., Liss, K.-D. D., Raabe, D., Rakha, K., Beladi, H., Xiong, X. Y., & Hodgson, P. D. (2016). Growth of bainitic ferrite and carbon partitioning during the early stages of bainite transformation in a 2 mass% silicon steel studied by in situ neutron diffraction, TEM and APT. *Journal of Applied Crystallography*, *49*(2), 399–414. https://doi.org/10.1107/S1600576716000418

794. Toji, Y., Matsuda, H., Herbig, M., Choi, P. P., & Raabe, D. (2014). Atomic-scale analysis of carbon partitioning between martensite and austenite by atom probe tomography and correlative transmission electron microscopy. *Acta Materialia*, *65*, 215–228. https://doi.org/10.1016/j.actamat.2013.10.064

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 77 of 87

795. Toji, Y., Matsuda, H., & Raabe, D. (2016). Effect of Si on the acceleration of bainite transformation by pre-existing martensite. *Acta Materialia*, *116*, 250–262. https://doi.org/10.1016/j.actamat.2016.06.044

796. Toji, Y., Miyamoto, G., & Raabe, D. (2015). Carbon partitioning during quenching and partitioning heat treatment accompanied by carbide precipitation. *Acta Materialia*, *86*, 137–147. https://doi.org/10.1016/j.actamat.2014.11.049

797. Tóth, L. S., Molinari, A., & Raabe, D. (1997). Modeling of rolling texture development in a ferritic chromium steel. *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, *28*(11), 2343–2351. https://doi.org/10.1007/s11661-997-0191-6

798. Traka, K., Sedighiani, K., Bos, C., Lopez, J. G., Angenendt, K., Raabe, D., & Sietsma, J. (2021). Topological aspects responsible for recrystallization evolution in an IF-steel sheet–Investigation with cellular-automaton simulations. *Computational Materials Science*, *198*, 110643.

799. Tytko, D., Choi, P. P., Klöwer, J., Kostka, A., Inden, G., & Raabe, D. (2012). Microstructural evolution of a Ni-based superalloy (617B) at 700 °c studied by electron microscopy and atom probe tomography. *Acta Materialia*, *60*(4), 1731–1740. https://doi.org/10.1016/j.actamat.2011.11.020

800. Tytko, D., Choi, P. P., & Raabe, D. (2015). Thermal dissolution mechanisms of AlN/CrN hard coating superlattices studied by atom probe tomography and transmission electron microscopy. *Acta Materialia*, *85*, 32–41. https://doi.org/10.1016/j.actamat.2014.11.004

801. Tytko, D., Choi, P. P., & Raabe, D. (2017). Oxidation behavior of ALN/CRN multilayered hard coatings. *Nano Convergence*, *4*(1), 2–6. https://doi.org/10.1186/s40580-017-0109-y

802. Varnik, F., Dorner, D., & Raabe, D. (2007). Roughness-induced flow instability: a lattice Boltzmann study. *Journal of Fluid Mechanics*, *573*, 191–209.

803. Varnik, F., Gross, M., Moradi, N., Zikos, G., Uhlmann, P., Müller-Buschbaum, P., Magerl, D., Raabe, D., Steinbach, I., & Stamm, M. (2011). Stability and dynamics of droplets on patterned substrates: insights from experiments and lattice Boltzmann simulations. *Journal of Physics: Condensed Matter*, *23*(18), 184112. https://doi.org/10.1088/0953-8984/23/18/184112

804. Varnik, F., Mandal, S., Chikkadi, V., Denisov, D., Olsson, P., Vågberg, D., Raabe, D., & Schall, P. (2014). Correlations of plasticity in sheared glasses. *Physical Review E*, *89*(4), 40301. https://doi.org/10.1103/PhysRevE.89.040301

805. Varnik, F., & Raabe, D. (2006). Scaling effects in microscale fluid flows at rough solid surfaces. *Modelling and Simulation in Materials Science and Engineering*, *14*(5), 857. https://doi.org/10.1088/0965-0393/14/5/004

806. Varnik, F., & Raabe, D. (2007). Chaotic flows in microchannels: A lattice Boltzmann study. *Molecular Simulation*, *33*(7), 583–587. https://doi.org/10.1080/08927020601030456

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 78 of 87

807. Varnik, F., & Raabe, D. (2008). Profile blunting and flow blockage in a yield-stress fluid: A molecular dynamics study. *Physical Review E*, *77*(1), 11504. https://doi.org/10.1103/PhysRevE.77.011504

808. Varnik, F., Truman, P., Wu, B., Uhlmann, P., Raabe, D., & Stamm, M. (2008). Wetting gradient induced separation of emulsions: a combined experimental and lattice Boltzmann computer simulation study. *Physics of Fluids*, *20*(7), 72104. https://doi.org/10.1063/1.2963958

809. Verbeken, K., Barbé, L., & Raabe, D. (2009). Evaluation of the crystallographic orientation relationships between FCC and BCC phases in TRIP steels. *ISIJ International*, *49*(10), 1601–1609. https://doi.org/10.2355/isijinternational.49.1601

810. Verbeken, K., van Caenegem, N., & Raabe, D. (2009). Identification of ε martensite in a Fe-based shape memory alloy by means of EBSD. *Micron*, *40*(1), 151–156. https://doi.org/10.1016/j.micron.2007.12.012

811. Volz, N., Zenk, C. H., Cherukuri, R., Kalfhaus, T., Weiser, M., Makineni, S. K., Betzing, C., Lenz, M., Gault, B., Fries, S. G., Schreuer, J., Vaßen, R., Virtanen, S., Raabe, D., Spiecker, E., Neumeier, S., & Göken, M. (2018). Thermophysical and Mechanical Properties of Advanced Single Crystalline Co-base Superalloys. *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, *49*(9), 4099–4109. https://doi.org/10.1007/s11661-018-4705-1

812. Voß, S., Palm, M., Stein, F., & Raabe, D. (2011). Phase equilibria in the Fe-Nb system. *Journal of Phase Equilibria and Diffusion*, *32*(2), 97–104.

813. Voß, S., Stein, F., Palm, M., & Raabe, D. (2010). Synthesis of defect-free single-phase bars of high-melting Laves phases through modified cold crucible levitation melting. *Materials Science and Engineering: A*, *527*(29–30), 7848–7853.

814. Wang, D., Diehl, M., Roters, F., & Raabe, D. (2018). On the role of the collinear dislocation interaction in deformation patterning and laminate formation in single crystal plasticity. *Mechanics of Materials*, *125*(July), 70–79. https://doi.org/10.1016/j.mechmat.2018.06.007

815. Wang, D., Shanthraj, P., Springer, H., & Raabe, D. (2018). Particle-induced damage in Fe–TiB2 high stiffness metal matrix composite steels. *Materials & Design*, *160*, 557–571. https://doi.org/10.1016/j.matdes.2018.09.033

816. Wang, F., Sandlöbes, S., Diehl, M., Sharma, L., Roters, F., & Raabe, D. (2014). In situ observation of collective grain-scale mechanics in Mg and Mg-rare earth alloys. *Acta Materialia*, *80*, 77–93. https://doi.org/10.1016/j.actamat.2014.07.048

817. Wang, M., Li, Z., & Raabe, D. (2018). In-situ SEM observation of phase transformation and twinning mechanisms in an interstitial high-entropy alloy. *Acta Materialia*, *147*, 236–246. https://doi.org/10.1016/j.actamat.2018.01.036

818. Wang, M. M., Tasan, C. C., Ponge, D., & Raabe, D. (2016). Spectral TRIP enables ductile 1.1 GPa martensite. *Acta Materialia*, *111*, 262–272. https://doi.org/10.1016/j.actamat.2016.03.070

819. Wang, M., Tasan, C. C., Koyama, M., Ponge, D., & Raabe, D. (2015). Enhancing Hydrogen Embrittlement Resistance of Lath Martensite by Introducing Nano-Films of Interlath Austenite. *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, *46*(9), 3797–3802. https://doi.org/10.1007/s11661-015-3009-y

820. Wang, M., Tasan, C. C., Ponge, D., Dippel, A. C., & Raabe, D. (2015). Nano-laminate TRIP-TWIP steel with dynamic strain partitioning and enhanced damage resistance. *Acta Materialia*, *85*, 216–228.

821. Wang, M.-M. M., Tasan, C. C. C., Ponge, D., Dippel, A.-Ch. C., Raabe, D. D., Dippel, A.-Ch. C., Tasan, C. C. C., Ponge, D., & Wang, M.-M. M. (2015). Nanolaminate transformation-induced plasticity-twinning-induced plasticity steel with dynamic strain partitioning and enhanced damage resistance. *Acta Materialia*, *85*, 216–228. https://doi.org/10.1016/j.actamat.2014.11.010

822. Wang, X., Liu, C., Sun, B., Ponge, D., Jiang, C., & Raabe, D. (2022). The dual role of martensitic transformation in fatigue crack growth. *Proceedings of the National Academy of Sciences of the United States of America*, *119*(9). https://doi.org/10.1073/pnas.2110139119

823. Wang, Y., Raabe, D., Klüber, C., & Roters, F. (2004). Orientation dependence of nanoindentation pile-up patterns and of nanoindentation microtextures in copper single crystals. *Acta Materialia*, *52*(8), 2229–2238. https://doi.org/10.1016/j.actamat.2004.01.016

824. Wang, Z., Lu, W., An, F., Song, M., Ponge, D., Raabe, D., & Li, Z. (2022). High stress twinning in a compositionally complex steel of very high stacking fault energy. *Nature Communications*, *13*(1), 3598. https://doi.org/10.1038/S41467-022-31315-2

825. Wang, Z., Lu, W., Raabe, D., & Li, Z. (2019). On the mechanism of extraordinary strain hardening in an interstitial high-entropy alloy under cryogenic conditions. *Journal of Alloys and Compounds*, *781*, 734–743. https://doi.org/10.1016/j.jallcom.2018.12.061

826. Wang, Z., Lu, W., Zhao, H., He, J., Wang, K., Zhou, B., Ponge, D., Raabe, D., & Li, Z. (2020). Formation mechanism of κ-carbides and deformation behavior in Si-alloyed FeMnAlC lightweight steels. *Acta Materialia*, *198*, 258–270.

827. Wang, Z., Lu, W., Zhao, H., Liebscher, C. H., He, J., Ponge, D., Raabe, D., & Li, Z. (2020). Ultrastrong lightweight compositionally complex steels via dual-nanoprecipitation. *Science Advances*, *6*(46), eaba9543.

828. Weber, F., Schestakow, I., Roters, F., & Raabe, D. (2008). Texture evolution during bending of a single crystal copper nanowire studied by EBSD and crystal plasticity finite element simulations. *Advanced Engineering Materials*, *10*(8), 737–741. https://doi.org/10.1002/adem.200800102

829. Wei, S., Ma, Y., & Raabe, D. (2024). One step from oxides to sustainable bulk alloys. *Nature*, *633*(8031), 816–822. https://doi.org/10.1038/s41586-024-07932-w

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 80 of 87

830. Wei, Y., Gault, B., Varanasi, R. S., Raabe, D., Herbig, M., & Breen, A. J. (2018). Machine-learning-based atom probe crystallographic analysis. *Ultramicroscopy*, *194*(July), 15–24. https://doi.org/10.1016/j.ultramic.2018.06.017

831. Wei, Y., Varanasi, R. S., Schwarz, T., Gomell, L., Zhao, H., Larson, D. J., Sun, B., Liu, G., Chen, H., & Raabe, D. (2021). Machine-learning-enhanced time-of-flight mass spectrometry analysis. *Patterns*, *2*(2), 100192.

832. Weiland, H., Nardiello, J., Zaefferer, S., Cheong, S., Papazian, J., & Raabe, D. (2009). Microstructural aspects of crack nucleation during cyclic loading of AA7075-T651. *Engineering Fracture Mechanics*, *76*(5), 709–714. https://doi.org/10.1016/j.engfracmech.2008.11.012

833. Welsch, E., Ponge, D., Hafez Haghighat, S. M., Sandlöbes, S., Choi, P., Herbig, M., Zaefferer, S., & Raabe, D. (2016). Strain hardening by dynamic slip band refinement in a high-Mn lightweight steel. *Acta Materialia*, *116*, 188–199. https://doi.org/10.1016/j.actamat.2016.06.037

834. Wen, Y. H. H., Peng, H. B., Si, H. T., Xiong, R. L., & Raabe, D. (2014). A novel high manganese austenitic steel with higher work hardening capacity and much lower impact deformation than Hadfield manganese steel. *Materials & Design*, *55*, 798–804. https://doi.org/10.1016/j.matdes.2013.09.057

835. Wen, Y. H., Peng, H. B., Raabe, D., Gutierrez-Urrutia, I., Chen, J., & Du, Y. Y. (2014). Large recovery strain in Fe-Mn-Si-based shape memory steels obtained by engineering annealing twin boundaries. *Nature Communications*, *5*, 1–2. https://doi.org/10.1038/ncomms5964

836. Wen, Y., Xiao, H., Peng, H., Li, N., & Raabe, D. (2015). Relationship between damping capacity and variations of vacancies concentration and segregation of carbon atom in an Fe-Mn alloy. *Metallurgical and Materials Transactions A*, *46*(11), 4828–4833.

837. Woldemedhin, M. T., Raabe, D., & Hassel, A. W. (2010). Anodic oxides on a beta type Nb–Ti alloy and their characterization by electrochemical impedance spectroscopy. *Physica Status Solidi (a)*, *207*(4), 812–816. https://doi.org/10.1002/pssa.200983324

838. Woldemedhin, M. T., Raabe, D., & Hassel, A. W. (2011). Grain boundary electrochemistry of β-type Nb–Ti alloy using a scanning droplet cell. *Physica Status Solidi (a)*, *208*(6), 1246–1251.

839. Woldemedhin, M. T., Raabe, D., & Hassel, A. W. (2012). Characterization of thin anodic oxides of Ti–Nb alloys by electrochemical impedance spectroscopy. *Electrochimica Acta*, *82*, 324–332. https://doi.org/10.1016/j.electacta.2012.06.029

840. Wong, S. L., Laptyeva, G., Brüggemann, T., Engler, O., Roters, F., Raabe, D., & Karhausen, K.-F. F. (2020). Microchemistry-dependent simulation of yield stress and flow stress in non-heat treatable Al sheet alloys. *Modelling and Simulation in Materials Science and Engineering*, *28*(3), 35010. https://doi.org/10.1088/1361-651X/ab71c0

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 81 of 87

841. Wong, S. L., Madivala, M., Prahl, U., Roters, F., & Raabe, D. (2016). A crystal plasticity model for twinning- and transformation-induced plasticity. *Acta Materialia*, *118*, 140–151. https://doi.org/10.1016/j.actamat.2016.07.032

842. Wu, G., Balachandran, S., Gault, B., Xia, W., Liu, C., Rao, Z., Wei, Y., Liu, S., Lu, J., & Herbig, M. (2020). Crystal–Glass High-Entropy Nanocomposites with Near Theoretical Compressive Strength and Large Deformability. *Advanced Materials*, *32*(34), 2002619.

843. Wu, X., Erbe, A., Raabe, D., & Fabritius, H. O. (2013). Extreme optical properties tuned through phase substitution in a structurally optimized biological photonic polycrystal. *Advanced Functional Materials*, *23*(29), 3615–3620. https://doi.org/10.1002/adfm.201203597

844. Wu, X., Li, Z., Rao, Z., Ikeda, Y., Dutta, B., Körmann, F., Neugebauer, J., & Raabe, D. (2020). Role of magnetic ordering for the design of quinary TWIP-TRIP high entropy alloys. *Physical Review Materials*, *4*(3), 33601. https://doi.org/10.1103/PhysRevMaterials.4.033601

845. Wu, X., Ma, D., Eisenlohr, P., Raabe, D., & Fabritius, H. O. (2016). From insect scales to sensor design: Modelling the mechanochromic properties of bicontinuous cubic structures. *Bioinspiration and Biomimetics*, *11*(4). https://doi.org/10.1088/1748-3190/11/4/045001

846. Wu, X., Makineni, S. K., Kontis, P., Dehm, G., Raabe, D., Gault, B., & Eggeler, G. (2018). On the segregation of Re at dislocations in the γ' phase of Ni-based single crystal superalloys. *Materialia*, *4*, 109–114. https://doi.org/10.1016/j.mtla.2018.09.018

847. Wu, X., Makineni, S. K., Liebscher, C. H., Dehm, G., Rezaei Mianroodi, J., Shanthraj, P., Svendsen, B., Bürger, D., Eggeler, G., Raabe, D., & Gault, B. (2020). Unveiling the Re effect in Ni-based single crystal superalloys. *Nature Communications*, *11*(1), 1–13. https://doi.org/10.1038/s41467-019-14062-9

848. Xiao, B., Lysogorskiy, Y., Savan, A., Bögershausen, H., Pfetzing-Micklich, J., Raabe, D., Drautz, R., & Ludwig, A. (2022). Correlations of Composition, Structure, and Hardness in the High-Entropy Alloy System Nb–Mo–Ta–W. *High Entropy Alloys & Materials*, *1*, 3. https://doi.org/10.1007/s44210-022-00007-3

849. Yan, D., Tasan, C. C., & Raabe, D. (2015). High resolution in situ mapping of microstrain and microstructure evolution reveals damage resistance criteria in dual phase steels. *Acta Materialia*, *96*, 399–409. https://doi.org/10.1016/j.actamat.2015.05.038

850. Yan, F. K., Tao, N. R., Archie, F., Gutiérrez-Urrutia, I., Raabe, D., Lu, K. K., Gutierrez-Urrutia, I., Raabe, D., & Lu, K. K. (2014). Deformation mechanisms in an austenitic single-phase duplex microstructured steel with nanotwinned grains. *Acta Materialia*, *81*, 487–500. https://doi.org/10.1016/j.actamat.2014.08.054

851. Yan, F., Mouton, I., Stephenson, L. T., Breen, A. J., Chang, Y., Ponge, D., Raabe, D., & Gault, B. (2019a). Atomic-scale investigation of hydrogen distribution in a TiMo alloy. *Scripta Materialia*, *162*, 321–325.

852. Yan, F., Mouton, I., Stephenson, L. T., Breen, A. J., Chang, Y., Ponge, D., Raabe, D., & Gault, B. (2019b). Atomic-scale investigation of hydrogen distribution in a Ti–Mo alloy. *Scripta Materialia*, *162*, 321–325. https://doi.org/10.1016/j.scriptamat.2018.11.040

853. Yao, M. J., Dey, P., Seol, J. B., Choi, P., Herbig, M., Marceau, R. K. W., Hickel, T., Neugebauer, J., & Raabe, D. (2016). Combined atom probe tomography and density functional theory investigation of the Al off-stoichiometry of κ-carbides in an austenitic Fe-Mn-Al-C low density steel. *Acta Materialia*, *106*, 229–238. https://doi.org/10.1016/j.actamat.2016.01.007

854. Yao, M. J., Pradeep, K. G., Tasan, C. C., & Raabe, D. (2014). A novel, single phase, non-equiatomic FeMnNiCoCr high-entropy alloy with exceptional phase stability and tensile ductility. *Scripta Materialia*, *72–73*, 5–8. https://doi.org/10.1016/j.scriptamat.2013.09.030

855. Yao, M. J., Welsch, E., Ponge, D., Haghighat, S. M. H., Sandlöbes, S., Choi, P., Herbig, M., Bleskov, I., Hickel, T., Lipinska-Chwalek, M., Shanthraj, P., Scheu, C., Zaefferer, S., Gault, B., & Raabe, D. (2017). Strengthening and strain hardening mechanisms in a precipitation-hardened high-Mn lightweight steel. *Acta Materialia*, *140*, 258–273. https://doi.org/10.1016/j.actamat.2017.08.049

856. Yardley, V., Povstugar, I., Choi, P. P., Raabe, D., Parsa, A. B., Kostka, A., Somsen, C., Dlouhy, A., Neuking, K., George, E. P., & Eggeler, G. (2016). On Local Phase Equilibria and the Appearance of Nanoparticles in the Microstructure of Single-Crystal Ni-Base Superalloys. *Advanced Engineering Materials*, *18*(9), 1556–1567. https://doi.org/10.1002/adem.201600237

857. Ye, X., Yan, F., Schäfer, L., Wang, D., Geßwein, H., Wang, W., Chellali, M. R., Stephenson, L. T., Skokov, K., & Gutfleisch, O. (2021). Magnetoelectric Tuning of Pinning-Type Permanent Magnets through Atomic-Scale Engineering of Grain Boundaries. *Advanced Materials*, *33*(5), 2006853.

858. Yu, Y., Zhang, S., Mio, A. M., Gault, B., Sheskin, A., Scheu, C., Raabe, D., Zu, F., Wuttig, M., Amouyal, Y., & Cojocaru-Mirédin, O. (2018). Ag-Segregation to Dislocations in PbTe-Based Thermoelectric Materials. *ACS Applied Materials and Interfaces*, *10*(4), 3609–3615. https://doi.org/10.1021/acsami.7b17142

859. Yu, Y., Zhou, C., Zhang, S., Zhu, M., Wuttig, M., Scheu, C., Raabe, D., Snyder, G. J., Gault, B., & Cojocaru-Mirédin, O. (2020). Revealing nano-chemistry at lattice defects in thermoelectric materials using atom probe tomography. *Materials Today*, *32*(February), 260–274. https://doi.org/10.1016/j.mattod.2019.11.010

860. Zaafarani, N., Raabe, D., Roters, F., & Zaefferer, S. (2008). On the origin of deformation-induced rotation patterns below nanoindents. *Acta Materialia*, *56*(1), 31–42. https://doi.org/10.1016/j.actamat.2007.09.001

861. Zaafarani, N., Raabe, D., Singh, R. N., Roters, F., & Zaefferer, S. (2006). Three-dimensional investigation of the texture and microstructure below a nanoindent in a Cu single crystal using 3D EBSD and crystal plasticity finite element simulations. *Acta Materialia*, *54*(7), 1863–1876. https://doi.org/10.1016/j.actamat.2005.12.014

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 83 of 87

862. Zachariah, Z., Balachandran, S., Liu, Z., Pourzal, R., McCarthy, S. M., Hall, D. J., Fischer, A., Raabe, D., & Herbig, M. (2021). On the formation mechanism of column damage within modular taper junctions. *The Journal of Arthroplasty*, *36*(7), 2603–2611.

863. Zaefferer, S., Kuo, J.-C. C., Zhao, Z., Winning, M., & Raabe, D. (2003). On the influence of the grain boundary misorientation on the plastic deformation of aluminum bicrystals. *Acta Materialia*, *51*(16), 4719–4735. https://doi.org/10.1016/S1359-6454(03)00259-3

864. Zaefferer, S., Wright, S., & Raabe, D. (2007). 3D-orientation microscopy in a FIB SEM: a new dimension of microstructure characterization. *Microscopy and Microanalysis*, *13*(S02), 1508–1509.

865. Zahn, D., Tlatlik, H., & Raabe, D. (2009). Modeling of dislocation patterns of small- and high-angle grain boundaries in aluminum. *Computational Materials Science*, *46*(2), 293–296. https://doi.org/10.1016/j.commatsci.2009.02.036

866. Zambaldi, C., & Raabe, D. (2010a). Crystal plasticity modelling and experiments for deriving microstructure-property relationships in γ-TiAl based alloys. *Journal of Physics: Conference Series*, *240*(1), 12140.

867. Zambaldi, C., & Raabe, D. (2010b). Plastic anisotropy of γ-TiAl revealed by axisymmetric indentation. *Acta Materialia*, *58*(9), 3516–3530. https://doi.org/10.1016/j.actamat.2010.02.025

868. Zambaldi, C., Roters, F., & Raabe, D. (2011). Analysis of the plastic anisotropy and pre-yielding of (γ/ α2)-phase titanium aluminide microstructures by crystal plasticity simulation. *Intermetallics*, *19*(6), 820–827. https://doi.org/10.1016/j.intermet.2011.01.012

869. Zambaldi, C., Roters, F., Raabe, D., & Glatzel, U. (2007). Modeling and experiments on the indentation deformation and recrystallization of a single-crystal nickel-base superalloy. *Materials Science and Engineering A*, *454–455*, 433–440. https://doi.org/10.1016/j.msea.2006.11.068

870. Zambaldi, C., Yang, Y., Bieler, T. R., & Raabe, D. (2012). Orientation informed nanoindentation of α-titanium: Indentation pileup in hexagonal metals deforming by prismatic slip. *Journal of Materials Research*, *27*(1), 356–367. https://doi.org/10.1557/jmr.2011.334

871. Zambaldi, C., Zehnder, C., & Raabe, D. (2015). Orientation dependent deformation by slip and twinning in magnesium during single crystal indentation. *Acta Materialia*, *91*, 267–288. https://doi.org/10.1016/j.actamat.2015.01.046

872. Zenk, C. H., Povstugar, I., Li, R., Rinaldi, F., Neumeier, S., Raabe, D., & Göken, M. (2017). A novel type of Co–Ti–Cr-base γ/γ' superalloys with low mass density. *Acta Materialia*, *135*, 244–251. https://doi.org/10.1016/j.actamat.2017.06.024

873. Zhang, H., Bai, B., & Raabe, D. (2011a). Superplastic martensitic Mn–Si–Cr–C steel with 900% elongation. *Acta Materialia*, *59*(14), 5787–5802.

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 84 of 87

874. Zhang, H., Bai, B., & Raabe, D. (2011b). Superplastic martensitic Mn-Si-Cr-C steel with 900% elongation. *Acta Materialia*, *59*(14), 5787–5802. https://doi.org/10.1016/j.actamat.2011.05.055

875. Zhang, H., Diehl, M., Roters, F., & Raabe, D. (2016). A virtual laboratory using high resolution crystal plasticity simulations to determine the initial yield surface for sheet metal forming operations. *International Journal of Plasticity*, *80*, 111–138. https://doi.org/10.1016/j.ijplas.2016.01.002

876. Zhang, H., Ponge, D., & Raabe, D. (2014a). Designing quadplex (four-phase) microstructures in an ultrahigh carbon steel. *Materials Science and Engineering A*, *612*, 46–53. https://doi.org/10.1016/j.msea.2014.06.023

877. Zhang, H., Ponge, D., & Raabe, D. (2014b). Superplastic Mn-Si-Cr-C duplex and triplex steels: Interaction of microstructure and void formation. *Materials Science and Engineering A*, *610*, 355–369. https://doi.org/10.1016/j.msea.2014.05.061

878. Zhang, H., Pradeep, K. G., Mandal, S., Ponge, D., Choi, P., Tasan, C. C., & Raabe, D. (2014a). Enhanced superplasticity in an Al-alloyed multicomponent Mn-Si-Cr-C steel. *Acta Materialia*, *63*, 232–244. https://doi.org/10.1016/j.actamat.2013.10.034

879. Zhang, H., Pradeep, K. G., Mandal, S., Ponge, D., & Raabe, D. (2014b). New insights into the austenitization process of low-alloyed hypereutectoid steels: Nucleation analysis of strain-induced austenite formation. *Acta Materialia*, *80*, 296–308. https://doi.org/10.1016/j.actamat.2014.07.073

880. Zhang, H., Pradeep, K. G., Mandal, S., Ponge, D., Springer, H., & Raabe, D. (2015). Dynamic strain-induced transformation: An atomic scale investigation. *Scripta Materialia*, *109*, 23–27. https://doi.org/10.1016/j.scriptamat.2015.07.010

881. Zhang, H., Springer, H., Aparicio-Fernández, R., & Raabe, D. (2016). Improving the mechanical properties of Fe–TiB2 high modulus steels through controlled solidification processes. *Acta Materialia*, *118*, 187–195. https://doi.org/10.1016/j.actamat.2016.07.056

882. Zhang, J. L., Tasan, C. C., Lai, M. J., Yan, D., & Raabe, D. (2017). Partial recrystallization of gum metal to achieve enhanced strength and ductility. *Acta Materialia*, *135*, 400–410. https://doi.org/10.1016/j.actamat.2017.06.051

883. Zhang, J. L., Tasan, C. C., Lai, M. L., Zhang, J., & Raabe, D. (2015). Damage resistance in gum metal through cold work-induced microstructural heterogeneity. *Journal of Materials Science*, *50*(17), 5694–5708. https://doi.org/10.1007/s10853-015-9105-y

884. Zhang, J. L., Zaefferer, S., & Raabe, D. (2015). A study on the geometry of dislocation patterns in the surrounding of nanoindents in a TWIP steel using electron channeling contrast imaging and discrete dislocation dynamics simulations. *Materials Science and Engineering A*, *636*, 231–242. https://doi.org/10.1016/j.msea.2015.03.078

885. Zhang, J., Raabe, D., & Tasan, C. C. (2017). Designing duplex, ultrafine-grained Fe-Mn-Al-C steels by tuning phase transformation and recrystallization kinetics. *Acta Materialia*, *141*, 374–387. https://doi.org/10.1016/j.actamat.2017.09.026

886. Zhang, J., Tasan, C. C., Lai, M. J., Dippel, A. C., & Raabe, D. (2017). Complexion-mediated martensitic phase transformation in Titanium. *Nature Communications*, *8*(May 2016), 1–8. https://doi.org/10.1038/ncomms14210

887. Zhang, S., Fang, H., Gramsma, M. E., Kwakernaak, C., Sloof, W. G., Tichelaar, F. D., Kuzmina, M., Herbig, M., Raabe, D., Brück, E., van der Zwaag, S., & van Dijk, N. H. (2016). Autonomous filling of grain-boundary cavities during creep loading in Fe-Mo alloys. *Metallurgical and Materials Transactions A*, *47*(10), 4831–4844. https://doi.org/10.1007/s11661-016-3642-0

888. Zhang, S., Kwakernaak, C., Tichelaar, F. D., Sloof, W. G., Kuzmina, M., Herbig, M., Raabe, D., Brück, E., van der Zwaag, S., & van Dijk, N. H. (2015). Autonomous repair mechanism of creep damage in Fe-Au and Fe-Au-BN alloys. *Metallurgical and Materials Transactions A*, *46*(12), 5656–5670. https://doi.org/10.1007/s11661-015-3169-9

889. Zhao, H., Chen, Y., Gault, B., Makineni, S. K., Ponge, D., & Raabe, D. (2020). (Al, Zn) 3Zr dispersoids assisted η' precipitation in anAl-Zn-Mg-Cu-Zr alloy. *Materialia*, *10*, 100641.

890. Zhao, H., de Geuser, F., Kwiatkowski da Silva, A., Szczepaniak, A., Gault, B., Ponge, D., & Raabe, D. (2018). Segregation assisted grain boundary precipitation in a model Al-Zn-Mg-Cu alloy. *Acta Materialia*, *156*, 318–329. https://doi.org/10.1016/j.actamat.2018.07.003

891. Zhao, H., Gault, B., Ponge, D., & Raabe, D. (2020). Reversion and re-aging of a peak aged Al-Zn-Mg-Cu alloy. *Scripta Materialia*, *188*, 269–273.

892. Zhao, H., Gault, B., Ponge, D., Raabe, D., & de Geuser, F. (2018). Parameter free quantitative analysis of atom probe data by correlation functions: Application to the precipitation in Al-Zn-Mg-Cu. *Scripta Materialia*, *154*, 106–110. https://doi.org/10.1016/j.scriptamat.2018.05.024

893. Zhao, H., Huber, L., Lu, W., Peter, N. J., An, D., de Geuser, F., Dehm, G., Ponge, D., Neugebauer, J., Gault, B., & Raabe, D. (2020). Interplay of Chemistry and Faceting at Grain Boundaries in a Model Al Alloy. *Physical Review Letters*, *124*(10). https://doi.org/10.1103/PhysRevLett.124.106102

894. Zhao, Z., Mao, W., Roters, F., & Raabe, D. (2004). A texture optimization study for minimum earing in aluminium by use of a texture component crystal plasticity finite element method. *Acta Materialia*, *52*(4), 1003–1012. https://doi.org/10.1016/j.actamat.2003.03.001

895. Zhao, Z., Ramesh, M., Raabe, D., Cuitiño, A. M., & Radovitzky, R. (2008). Investigation of three-dimensional aspects of grain-scale plastic surface deformation of an aluminum oligocrystal. *International Journal of Plasticity*, *24*(12), 2278–2297. https://doi.org/10.1016/j.ijplas.2008.01.002

896. Zheng, C., & Raabe, D. (2013). Interaction between recrystallization and phase transformation during intercritical annealing in a cold-rolled dual-phase steel: A

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 86 of 87

cellular automaton model. *Acta Materialia*, *61*(14), 5504–5517. https://doi.org/10.1016/j.actamat.2013.05.040

897. Zheng, C., Raabe, D., & Li, D. (2012). Prediction of post-dynamic austenite-to-ferrite transformation and reverse transformation in a low-carbon steel by cellular automaton modeling. *Acta Materialia*, *60*(12), 4768–4779. https://doi.org/10.1016/j.actamat.2012.06.007

898. Zhou, X., Bai, Y., El-Zoka, A. A., Kim, S.-H., Ma, Y., Liebscher, C. H., Gault, B., Mianroodi, J. R., Dehm, G., & Raabe, D. (2022). Effect of Pore Formation on Redox-Driven Phase Transformation. *Physical Review Letters*, *130*(16), 168001. https://doi.org/10.1103/PhysRevLett.130.168001

899. Zhou, X., Kamachali, R. D., Boyce, B. L., Clark, B. G., Raabe, D., & Thompson, G. B. (2021). Spinodal Decomposition in Nanocrystalline Alloys. *Acta Materialia*, 117054.

900. Zhu, M., Sun, D., Pan, S., Zhang, Q., & Raabe, D. (2014). Modelling of dendritic growth during alloy solidification under natural convection. *Modelling and Simulation in Materials Science and Engineering*, *22*(3), 34006. https://doi.org/10.1088/0965-0393/22/3/034006

901. Zilnyk, K. D., Almeida Junior, D. R., Sandim, H. R. Z., Rios, P. R., & Raabe, D. (2018). Misorientation distribution between martensite and austenite in Fe-31 wt%Ni-0.01 wt%C. *Acta Materialia*, *143*, 227–236. https://doi.org/10.1016/j.actamat.2017.10.026

902. Zilnyk, K. D., Junior, D. R. A., Sandim, H. R. Z., Rios, P. R., & Raabe, D. (2018). Misorientation distribution between martensite and austenite in Fe-31 wt% Ni-0.01 wt% C. *Acta Materialia*, *143*, 227–236.

903. Zilnyk, K. D., Oliveira, V. B., Sandim, H. R. Z., Möslang, A., & Raabe, D. (2015). Martensitic transformation in Eurofer-97 and ODS-Eurofer steels: A comparative study. *Journal of Nuclear Materials*, *462*, 360–367.

904. Zilnyk, K. D., Pradeep, K. G., Choi, P., Sandim, H. R. Z., & Raabe, D. (2017). Long-term thermal stability of nanoclusters in ODS-Eurofer steel: An atom probe tomography study. *Journal of Nuclear Materials*, *492*, 142–147. https://doi.org/10.1016/j.jnucmat.2017.05.027

905. Zilnyk, K. D., Sandim, H. R. Z. R. Z., Bolmaro, R. E., Lindau, R., Möslang, A., Kostka, A., & Raabe, D. (2014). Long-term microstructural stability of oxide-dispersion strengthened Eurofer steel annealed at 800° C. *Journal of Nuclear Materials*, *448*(1–3), 33–42. https://doi.org/10.1016/j.jnucmat.2014.01.032

Ex. 2014
IPR2024-01376
ArcelorMittal Ex. 2020
Page 87 of 87