

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

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 Technical 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-Boundary Cavities 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 Büyükkuslu, Dierk Raabe

	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

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 $\langle 111 \rangle$ 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>

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<https://doi.org/10.1016/j.jmatprotec.2017.10.008>
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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>
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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>
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<https://doi.org/10.1016/j.actamat.2022.117899>
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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.

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<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>
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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>
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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](https://doi.org/10.1016/S0921-5093(97)00104-4)
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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>
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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>

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