**Curriculum Vitae**

**Personal Data**

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| Title | Prof. Dr.-Ing. Habil. Dr. h.c. |
| First name | Dierk |
| Name | Raabe |
| Current position | Managing Director Max-Planck-Institut<br>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<br>Director, Max-Planck-Institut für Eisenforschung (now MPI for Sustainable Materials), Düsseldorf, Germany<br>1997 – today<br>Professor (APL), Physical Metallurgy and Metal Physics, RWTH Aachen, Germany<br>Postdoctoral researcher, Dept. Materials Science & Engineering, Carnegie Mellon University, USA<br>1992 – 1997<br>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.

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| | 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 |

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| 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)**

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| 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<br>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; ^<br>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)<br>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<br>Hauke Springer, Isnaldi Souza, Alisson da Silva, Ömer Büyükuslu, Dierk Raabe |

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| | 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<br>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,<br>100th anniversary year lecture of the Department of Materials Science & Metallurgy, University of Cambridge |
| 2019 | Bauerman Lecture Award<br>Imperial College, London |
| 2018 | Seidman Lecture Award<br>Tel Aviv University |
| 2019 | TMS Light Metals Award (Aluminium Alloys) |
| 2014 | Honorary Professor, Katholieke Universiteit Leuven, Belgium |
| 2011 | DGM Award<br>Award of the German Society for Materials Science |
| 2011 | Weinberg Lecture Award<br>University of British Columbia |
| 2008 | Lee Hsun Lecture Award<br>the Chinese Academy of Sciences |
| 2001 | Materials Science and Technology Award<br>the Federation of European Materials Science Societies FEMS |
| 1997 | Masing Award<br>German Society for Materials Science DGM |
| 1997 | Heisenberg Scholarship<br>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 <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

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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

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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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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

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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

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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

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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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