

Prof. Dr.-Ing. Horst Hahn

ResearcherID: G-9018-2011
ORCID-ID: 0000-0001-9901-3861
Nationality: German
Gender: male



Main affiliation:

The University of Oklahoma
Distinguished Materials Visiting Professor
201 Stephenson Pkwy.
Norman, OK 73019
USA
Cell phone: +1 (405) 308-2121
Email: horst.hahn@ou.edu

Further affiliations:

Karlsruhe Institute of Technology
KIT Distinguished Senior Fellow
Institute of Nanotechnology
Hermann-von-Helmholtz Platz 1
D-76344 Eggenstein-Leopoldshafen
Germany
Tel.: +49 (0)721 608-26350
Email: horst.hahn@kit.edu

Technical University Darmstadt
Institute of Materials Science
Joint Research Laboratory Nanomaterials
Otto-Berndt-Str. 3
D-64206 Darmstadt
Germany

University training and degree

1972-1978 Materials Science, University of Saarland, Saarbrücken; Dipl.-Ing. Materials Science

Advanced academic qualification

1982-1985 Post-doctoral fellow at University of Saarland, Germany

1978-1982 PhD program, Technical University Berlin; Degree: Dr.-Ing. Materials Physics

Postgraduate professional career

since 2022 Distinguished Materials Visiting Professor, The University of Oklahoma, USA

since 2022 KIT Distinguished Senior Fellow, Karlsruhe Institute of Technology (KIT), Institute of Nanotechnology, Germany

2004-2022 Executive Director, Institute of Nanotechnology, Karlsruhe Institute of Technology (KIT), Germany

2004-2022 Head of KIT-TUD Joint Research Laboratory Nanomaterials, Institute of Materials Science, TU Darmstadt, Germany

- 2006-2019 Spokesperson of Helmholtz Programs in Nanotechnology at Karlsruhe Institute of Technology (KIT), Germany
- 2012-2022 Principal Investigator at Herbert Gleiter Institute of Nanoscience, Nanjing, China
- 2011-2015 Founding Director of Helmholtz Institute Ulm for Electrochemical Energy Storage, Germany
- 1992-2004 Full Professor, Institute of Materials Science, Technical University Darmstadt, Germany
- 1990-1992 Associate Professor (tenure) at Department of Materials Science and Engineering, Rutgers University, New Brunswick, USA
- 1987-1990 Research Assistant Professor, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, USA
- 1985-1987 Research Associate, Materials Science Division, Argonne National Laboratory, USA

Calls

Calls for professorships: Rutgers University, New Jersey, USA (accepted, 1990); Technische Universität Darmstadt (accepted, 1992); University of Florida, Gainesville (denied, 1999); Forschungszentrum Karlsruhe (now KIT, accepted, 2004)

Honors and awards

- Fellow of the National Academy of Inventors, USA (2019)
- Foreign Member of the National Academy of Engineering, USA (2017)
- Member of Leopoldina – National Academy of Germany (2010)
- Member of The European Academy of Science (2010)

- Robert Franklin Mehl Award of The Minerals, Metals & Materials Society, USA (2013)
- Heyn Denkmünze of Deutsche Gesellschaft für Materialkunde (DGM), Germany (2012)
- Fellow of the Materials Research Society (MRS), Pittsburgh, USA (2010)

- Guest Professor at Lanzhou University, Lanzhou, China (2007)
- Distinguished Visiting Professor at University of California Irvine (2019 – 2023)
- Honorary Professor at Xi'an Jiaotong University, Xi'an, China (2018)
- Distinguished Professor at IIT Madras, India (lifetime position) (2005)
- Honorary Professor at University of Hyderabad, Physics Department, Hyderabad, India (2004)
- Nanotechnology Award of the Deutsche Bank, Berlin, Germany (jointly with Profs. Gleiter and Fecht) (2003)
- Visiting Professor at Nanyang Technological University, School of Materials Engineering, Singapore (2002)
- Fellowship of Fritz-Thyssen Foundation for highly-qualified young scientists (1982)

Selected positions and memberships in committees

- Chairman (Obmann) of Section Engineering Sciences of Deutsche Akademie der Naturforscher Leopoldina (German National Academy of Sciences), Halle, Germany (2016-2024)
- Member of University Council of University of Osnabrück, Germany (2020-2023)
- Member of Scientific Advisory Boards at IFW Dresden, IOM Leipzig and ZHM Hamburg
- Editor-in-Chief of Materials Science and Engineering A (2023-ongoing)
- Editor of Scripta Materialia (past)
- Editor of Materials Letters (past)
- Member and Chairman of International Committee on Nanostructured Materials (past)

Other professional activities

- Reviewer for Deutsche Forschungsgemeinschaft (DFG, National Science Foundation of Germany) for individual projects and for Consolidated Research Centers (CRC)
- Reviewer for projects for Federal Ministry of Education and Research (bmbf)

- Reviewer for European Research Council (ERC)
- Reviewer for US Department of Energy (DOE), individual applications and Energy Frontier Research Centers (EFRC)
- Reviewer for national funding agencies in Europe, for example, Switzerland, Poland, Austria, France, Italy, Spain, and more
- Reviewer for many international peer-reviewed journals, such as Nature, Nature Materials, Nature Nanotechnology, Scientific Reports, Nature Reviews, Science, Progress in Materials Science, ACS Nano, Advanced Materials, Advanced Functional Materials, Advanced Electronic Materials, Journal of Applied Physics, Applied Physics Letters, Chemistry of Materials, IEEE Electron Device Letters, Journal of Magnetism and Magnetic Materials, Journal of Materials Chemistry, Journal of Materials Science, Acta Materialia, Scripta Materialia, Journal of Power Sources, Journal of the American Ceramic Society, Materials Letters, Materials Research Letters, Materials Today, Small, Solid State Ionics, Thin Solid Films, and more

Publications & patents

Publications:

Web of Science: > 580 peer-reviewed publications; h-index = 72 (as of December 27, 2023)

Google Scholar: 915 publications; h-index = 90; i10-index = 446

Patents:

> 70 patents and patent applications, incl. 14 US patents

Publications (25 important and highly cited on major research activities)

High entropy materials

1. A. Sarkar, L. Velasco, D. Wang, Q. Wang, G. Talasila, L. de Biasi, C. Kübel, T. Brezesinski, S.S. Bhattacharya, H. Hahn, B. Breitung, High entropy oxides for reversible energy storage, Nat. Commun. 9 (2018) 3400. <https://doi.org/10.1038/s41467-018-05774-5>. (567 citations)
2. A. Sarkar, Q. Wang, A. Schiele, M.R. Chellali, S.S. Bhattacharya, D. Wang, T. Brezesinski, H. Hahn, L. Velasco, B. Breitung, High-Entropy Oxides: Fundamental Aspects and Electrochemical Properties, Adv. Mater. 31 (2019) 1806236. <https://doi.org/10.1002/adma.201806236>. (472 citations)
3. A. Sarkar, R. Djenadic, D. Wang, C. Hein, R. Kautenburger, O. Clemens, H. Hahn, Rare earth and transition metal based entropy stabilised perovskite type oxides, J. Eur. Ceram. Soc. 38 (2018) 2318–2327. <https://doi.org/10.1016/j.jeurceramsoc.2017.12.058>. (285 citations)
4. Y. Ma, Y. Ma, Q. Wang, S. Schweidler, M. Botros, T. Fu, H. Hahn, T. Brezesinski, B. Breitung, High-entropy energy materials: challenges and new opportunities, Energy & Environ. Sci. 14 (2021) 2883–2905. <https://doi.org/10.1039/D1EE00505G>. (208 citations)
5. R. Djenadic, A. Sarkar, O. Clemens, C. Loho, M. Botros, V.S.K. Chakravadhanula, C. Kübel, S.S. Bhattacharya, A.S. Gandhi, H. Hahn, Multicomponent equiatomic rare earth oxides, Mater. Res. Lett. 5 (2017) 102–109. <https://doi.org/10.1080/21663831.2016.1220433>. (204 citations)
6. Q. Wang, A. Sarkar, D. Wang, L. Velasco, R. Azmi, S.S. Bhattacharya, T. Bergfeldt, A. Düvel, P. Heitjans, T. Brezesinski, H. Hahn, B. Breitung, Multi-anionic and -cationic compounds: new high entropy materials for advanced Li-ion batteries, Energy & Environ. Sci. 12 (2019) 2433–2442. <https://doi.org/10.1039/C9EE00368A>. (201 citations)
7. A. Sarkar, R. Djenadic, N.J. Usharani, K.P. Sanghvi, V.S.K. Chakravadhanula, A.S. Gandhi, H. Hahn, S.S. Bhattacharya, Nanocrystalline multicomponent entropy stabilised transition metal oxides, J. Eur. Ceram. Soc. 37 (2017) 747–754. <https://doi.org/10.1016/j.jeurceramsoc.2016.09.018>. (199 citations)

8. A. Sarkar, C. Loho, L. Velasco, T. Thomas, S.S. Bhattacharya, H. Hahn, R. Djenadic, Multicomponent equiatomic rare earth oxides with a narrow band gap and associated praseodymium multivalency, *Dalt. Trans.* 46 (2017) 12167–12176. <https://doi.org/10.1039/C7DT02077E>. (163 citations)
9. R. Witte, A. Sarkar, R. Kruk, B. Eggert, R.A. Brand, H. Wende, H. Hahn, High-entropy oxides: An emerging prospect for magnetic rare-earth transition metal perovskites, *Phys. Rev. Mater.* 3 (2019) 034406. <https://doi.org/10.1103/PhysRevMaterials.3.034406>. (130 citations)

Simulation of materials processes

10. Z.-H. Jin, P. Gumbsch, K. Albe, E. Ma, K. Lu, H. Gleiter, H. Hahn, Interactions between non-screw lattice dislocations and coherent twin boundaries in face-centered cubic metals, *Acta Mater.* 56 (2008) 1126–1135. <https://doi.org/10.1016/j.actamat.2007.11.020>. (443 citations)
11. Z.-H. Jin, P. Gumbsch, E. Ma, K. Albe, K. Lu, H. Hahn, H. Gleiter, The interaction mechanism of screw dislocations with coherent twin boundaries in different face-centred cubic metals, *Scr. Mater.* 54 (2006) 1163–1168. <https://doi.org/10.1016/j.scriptamat.2005.11.072>. (371 citations)

Nanocrystalline materials and nanoglasses: synthesis, characterization, properties

12. R.W. Siegel, S. Ramasamy, H. Hahn, L. Zongquan, L. Ting, R. Gronsky, I. Introduction, Synthesis, characterization, and properties of nanophase TiO₂, *J. Mater. Res.* 3 (1988) 1367–1372. DOI: [10.1557/JMR.1988.1367](https://doi.org/10.1557/JMR.1988.1367). (312 citations)
13. H. Hahn, J. Logas, R.S. Averback, Sintering characteristics of nanocrystalline TiO₂, *J. Mater. Res.* 5 (1990) 609–614. <https://doi.org/10.1557/JMR.1990.0609>. (279 citations)
14. R. Schmechel, M. Kennedy, H. von Seggern, H. Winkler, M. Kolbe, R.A.A. Fischer, L. Xiaomao, A. Benker, M. Winterer, H. Hahn, Luminescence properties of nanocrystalline Y₂O₃:Eu³⁺ in different host materials, *J. Appl. Phys.* 89 (2001) 1679. <https://doi.org/10.1063/1.1333033>. (275 citations)
15. H. Hahn, R.S. Averback, The production of nanocrystalline powders by magnetron sputtering, *J. Appl. Phys.* 67 (1990) 1113–1115. <https://doi.org/10.1063/1.345798>. (219 citations)
16. H. Hahn, K.A. Padmanabhan, A model for the deformation of nanocrystalline materials, *Philos. Mag. B.* 76 (1997) 559–571. <https://doi.org/10.1080/01418639708241122>. (199 citations)
17. H. Hahn, P. Mondal, K.A. Padmanabhan, Plastic deformation of nanocrystalline materials, *Nanostructured Mater.* 9 (1997) 603–606. (191 citations)
18. R.Z. Valiev, M.J. Zehetbauer, Y. Estrin, H.W. Höppel, Y. Ivanisenko, H. Hahn, G. Wilde, H.J. Roven, X. Sauvage, T.G. Langdon, The Innovation Potential of Bulk Nanostructured Materials, *Adv. Eng. Mater.* 9 (2007) 527–533. <https://doi.org/10.1002/adem.200700078>. (177 citations)
19. J.X. Fang, U. Vainio, W. Puff, R. Würschum, X.L. Wang, D. Wang, M. Ghafari, F. Jiang, J. Sun, H. Hahn, H. Gleiter, Atomic Structure and Structural Stability of Sc₇₅Fe₂₅ Nanoglasses, *Nano Lett.* 12 (2012) 458–463. <https://doi.org/10.1021/nl2038216>. (137 citations)

Irradiation effects

20. M. Rose, A.G. Balogh, H. Hahn, Instability of irradiation induced defects in nanostructured materials, Nucl. Instruments Methods Phys. Res. Sect. B Beam Interact. with Mater. Atoms. 127–128 (1997) 119–122. [https://doi.org/10.1016/S0168-583X\(96\)00863-4](https://doi.org/10.1016/S0168-583X(96)00863-4). (225 citations)

Printed Electronics and Batteries

21. T. Danner, M. Singh, S. Hein, J. Kaiser, H. Hahn, A. Latz, Thick electrodes for Li-ion batteries: A model based analysis, J. Power Sources. 334 (2016) 191–201. <https://doi.org/10.1016/j.jpowsour.2016.09.143>. (172 citations)
22. S.K. Garlapati, M. Divya, B. Breitung, R. Kruk, H. Hahn, S. Dasgupta, Printed Electronics Based on Inorganic Semiconductors: From Processes and Materials to Devices, Adv. Mater. 1707600 (2018) 1707600. <https://doi.org/10.1002/adma.201707600>. (133 citations)

Other topics

23. J. Fang, S. Du, S. Lebedkin, Z. Li, R. Kruk, M. Kappes, H. Hahn, Gold Mesostructures with Tailored Surface Topography and Their Self-Assembly Arrays for Surface-Enhanced Raman Spectroscopy, Nano Lett. 10 (2010) 5006–5013. <https://doi.org/10.1021/nl103161q>. (293 citations)
24. A. Vijayaraghavan, S. Blatt, D. Weissenberger, M. Oron-Carl, F. Hennrich, D. Gerthsen, H. Hahn, R. Krupke, Ultra-Large-Scale Directed Assembly of Single-Walled Carbon Nanotube Devices, Nano Lett. 7 (2007) 1556–1560. <https://doi.org/10.1021/nl0703727>. (259 citations)
25. A. Melikyan, N. Lindenmann, S. Walheim, P.M.M. Leufke, S. Ulrich, J. Ye, P. Vincze, H. Hahn, T. Schimmel, C. Koos, W. Freude, J. Leuthold, Surface plasmon polariton absorption modulator, Opt. Express. 19 (2011) 8855. <https://doi.org/10.1364/OE.19.008855>. (205 citations)