Vivek Devulapalli, Ph.D.

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Professional summary

I am an early-career postdoctoral researcher specializing in advanced electron microscopy with a materials science background. I employ aberration-corrected STEM to link atomic structure and composition to material properties across multiple length scales. My expertise includes multidimensional imaging, analytical techniques, STEM simulations, and correlative approaches for comprehensive material characterization.

My PhD work on grain boundary engineering in titanium, including the discovery of segregation-induced phase transitions, culminated in a Science publication (2024). As a postdoc at MPIE, I expanded into hydrogen embrittlement mechanisms in particle-reinforced high-entropy alloys, combining advanced characterization with mechanical testing. Currently at EMPA, I employ in-situ S/TEM techniques to investigate deformation mechanisms across diverse material systems, from single crystals to complex multilayered architectures. Beyond research, I am committed to open science practices and active science communication.

Scientific career

2024 – Present **Postdoctoral researcher, EMPA, Thun, Switzerland**
Project: *In-situ TEM tensile testing of crystalline-amorphous nanolayered materials*
SNSF proposal: *Grain boundary atomic scale mechanics in Ti (GRABIT)*
Innosuisse Project: *Quantized nanolaminates as industrial magnetron sputtering process*
PI: *Prof. Johann Michler, Dr. Xavier Maeder*

2022 – 2024 **Postdoctoral researcher, Max-Planck Institut für Eisenforschung, Düsseldorf, Germany**
DFG Project: *Mechanical properties and hydrogen tolerance of particle-reinforced CCA produced by additive manufacturing*
PI: *Prof. Gerhard Dehm, Prof. Eric Jägle*

2018 – 2022 **PhD, Max-Planck Institut für Eisenforschung, Düsseldorf, Germany**
Advanced transmission electron microscopy group, Department of structure and nano-/ micromechanics of materials
Thesis title: *Microstructure and grain boundary evolution in titanium thin films.*
Supervisor: *Prof. Gerhard Dehm*, Group leader: *Dr. Christian Liebscher*

2016 – 2018 **M.Tech., Indian Institute of Technology, Madras, India**
Metallurgical and materials engineering department
Thesis title: *Correlative microscopy of Magnesium - rare-earth alloys.*
Thesis work performed as a **DAAD exchange program at Materials Chemistry, RWTH Aachen, Germany** with *Prof. Jochen Schneider*
Supervisors: *Prof. B S Murty, Prof. K G Pradeep*

2012 – 2016 **B.Tech., National Institute of Technology, Raipur, India** in Metallurgical engineering
CGPA: 9.22/10 (Honours)

Research Publications

First Author Publications

1. **Devulapalli, V.**, Klimashin, F. F., Bärtschi, M., Waldner, S., Schwyn Thöny, S., Michler, J., & Maeder, X. (2025). Inverse hall patch strengthening and in situ deformation mechanics in ta2o5 - sio2 quantum nanolaminates [Manuscript submitted (Scripta Materialia)].

2. **Devulapalli, V.**, Prabhakar, M., Schulz, F., Maeder, X., Jägle, E. A., Duarte, J., & Dehm, G. (2025). Hydrogen induced softening and deformation mechanisms in nanoparticle reinforced cocrfeni [Manuscript prepared (waiting for co-author approval)].

3. **Devulapalli, V.**, Vermeij, T., Sharma, A., Michler, J., & Maeder, X. (2025). Enhanced toughness in cu–al nanolaminate films with amorphous al_2o_3 interlayers: Insights from in situ tem tensile testing [Manuscript in preparation].

4. **Devulapalli, V.**, Schulz, F., Barreto, E. S., Ellendt, N., Jägle, E. A., & Dehm, G. (2024). Laser powder bed fusion synthesis of nanoparticle reinforced cocrfeni. *Additive Manufacturing*, *91*, 104338. https://doi.org/10.1016/j.addma.2024.104338

5. **Devulapalli, V.**, Chen, E., Brink, T., Frolov, T., & Liebscher, C. (2024). Segregation induced grain boundary phase transition in titanium. *Science*, *386*, 420–424. https://doi.org/10.1126/science.adq4147

6. **Devulapalli, V.**, Hans, M., Sukumar, P. T., Schneider, J. M., Dehm, G., & Liebscher, C. (2022). Microstructure, grain boundary evolution and anisotropic fe segregation in (0001) textured ti thin films. *Acta Materialia*, *238*, 118180. https://doi.org/https://doi.org/10.1016/j.actamat.2022.118180

7. **Devulapalli, V.**, Bishara, H., Ghidelli, M., Dehm, G., & Liebscher, C. (2021). Influence of substrates and e-beam evaporation parameters on the microstructure of nanocrystalline and epitaxially grown ti thin films. *Applied Surface Science*, *562*, 150194. https://doi.org/https://doi.org/10.1016/j.apsusc.2021.150194

Co-authored Publications

1. Lyrio, M., Oliveira, H., Sandim, M., **Devulapalli, V.**, & Sandim, H. (2025). Effect of the scanning strategy on texture of grain-oriented electrical steel (fe-4wt.% si) processed via laser powder-bed fusion and subsequent thermomechanical processing. *Materials Characterization*, *221*, 114789. https://doi.org/10.1016/j.matchar.2025.114789

2. Chatzopoulou, P., Hilliard, D., Vasileiadis, I. G., Florini, N., **Devulapalli, V.**, Liebscher, C. H., Lymperakis, L., Komninou, P., Kehagias, T., & Dimakis, E. (2025). Elastic limit and relaxation of gaas/in(al,ga)as core/shell nanowires for near-infrared applications [Focus on Nanowires 2023-24]. *Nanotechnology*, *36*(9), 095703. https://doi.org/10.1088/1361-6528/ad9d4a

3. Bärtschi, M., Waldner, S., Thöny, S. S., Maeder, X., Steger, F., Frei, T., & **Devulapalli, V.** (2025). Uv coatings using ta2o5-sio2 quantized nanolaminates. *Journal of the European Optical Society-Rapid Publications*, *21*(1), 24.

4. Byloff, J., Trost, C. O. W., **Devulapalli, V.**, Altaf Husain, S., Faurie, D., Renault, P.-O., Edwards, T. E. J., Cordill, M. J., Casari, D., & Putz, B. (2025). Atomic layer-deposited interlayers for robust metal–polymer interfaces. *ACS Applied Materials & Interfaces*.

5. Senol, S., Li, G., **Devulapalli, V.**, Brodu, E., & Vanmeensel, K. (2024). High strength and fatigue performance achieved for l-pbf processed hybrid particle reinforced al-cu-mg composite. *Composites Part B: Engineering*, *285*, 111736. https://doi.org/10.1016/j.compositesb.2024.111736

6. Dhekne, P. P., Vermeij, T., **Devulapalli, V.**, Jadhav, S. D., Hoefnagels, J. P., Geers, M. G., & Vanmeensel, K. (2023). Micro-mechanical deformation behavior of heat-treated laser powder bed fusion processed ti-6al-4v. *Scripta Materialia*, *233*, 115505. https://doi.org/https://doi.org/10.1016/j.scriptamat.2023.115505

7. Gärtner, E., Witte, A., Peter, N. J., **Devulapalli, V.**, Ellendt, N., Dehm, G., Jägle, E. A., Uhlenwinkel, V., & Mädler, L. (2023). Melt pool signatures of tin nanoparticle dry-coated $Co_{25}Cr_{25}Fe_{25}Ni_{25}$ metal powder in laser-powder-bed-fusion. *Materials & Design*, *226*, 111626. https://doi.org/https://doi.org/10.1016/j.matdes.2023.111626

8. Vasileiadis, I. G., Lymperakis, L., Adikimenakis, A., Gkotinakos, A., **Devulapalli, V.**, Liebscher, C. H., Androulidaki, M., Hübner, R., Karakostas, T., Georgakilas, A., Komninou, P., Dimakis, E., & Dimitrakopulos, G. P. (2021). Substitutional synthesis of sub-nanometer InGaN/GaN quantum wells with high indium content. *Scientific Reports*, *11*(1), 20606. https://doi.org/10.1038/s41598-021-99989-0

Skills

Instruments with 5+ years of hands-on experience
- Thin film deposition, Material characterization on all length scales - XRD, SEM, EDS, EBSD, FIB, TEM, Multi-dimensional STEM techniques (EELS, ACOM, 4DSTEM), APT.

Programming
- Python - multidimensional microscopy data analysis and image processing (py4Dstem, hyperspy), image simulation (abTEM, prismatic), image processing (numpy, sckitimage), data vizualization (mpl), LaTeX.

Skills (continued)

Softwares
- Velox/ Digital-micrograph, Crystallographic analysis (MTEX), Image-j, Origin, Ovito, Vesta, Inkscape, Adobe Premier pro, MS-Office.

Conferences

Talk
- FEMS-Euromat, Granada, Spain (2025)
  Hydrogen induced softening and deformation mechanisms in nanoparticle reinforced CoCrFeNi.
- FEMS-Euromat, Granada, Spain (2025)
  In situ TEM investigation of fracture growth in novel nanolaminate thin films.
- MecaNano - General meeting, Krakow, Poland (2025)
  Fracture behaviour in Cu-Al multilayer thin films with amorphous AlO interlayers: Insights from in-situ TEM tensile testing.
- International Conference on Correlative Electron Microscopy, Brno, Czech Republic (2025)
  Enhancing Thin Film Toughness: The Role of Amorphous Interlayers.
- FEMS - Euromat, Frankfurt, Germany (2023)
  Additively manufactured particle reinforced-CoCrFeNi: Microstructure, mechanical behaviour and hydrogen response.
- MSE Darmdtadt (Virtual), Darmstadt, Germany (2020)
  Unravelling grain boundary structures in Ti thin films using aberration-corrected transmission electron microscopy.

Poster
- International Microscopy Conference (IMC20), South-Korea (2023)
  Experimental observation of segregation induced grain boundary phase transition in titanium
- Microscopy Conference 2021, Vienna, Austria (Virtual) (2021)
  Unravelling the atomic structure and segregation of $\Sigma 13$ [0001] tilt grain boundaries in titanium by advanced STEM.
- IAMNano, Düsseldorf, Germany (2019)
  From epitaxially grown thin films to grain boundary analysis in Cu and Ti.

Positions of Responsibility

Supervision and teaching experience

1. Supervised a Cambridge University summer intern for 8 weeks, 2023.
2. Peer-reviewed a full-length journal article for *Materialia*, 2023.
3. Delivered a lecture on 'grain boundaries' as part of a seminar series at MPIE, 2021.
4. Served as a teaching assistant under Prof. Ravi Shankar Kottada, IIT - Madras, 2016.

Leadership & Organization

1. Member of European Microscopy Society (EMS) and Deutsche Gesellschaft für Elektronenmikroskopie e.V. (DGE), 2019-present.
2. Internal PhD representative, 2019-2022.
3. Member of MPIE's sustainability team, 2021-2023.
4. Organized and participated in a teaching seminars and career planning seminar, 2021-2022.
5. Managed MPIE's Twitter account, 2020-2023.
6. Coordinated department weekly-seminars, 2022-23.
7. Managed a high-vacuum furnace, 2021-2023.

Science communication

1. Developed interactive web-based teaching tools for materials science concepts, demonstrating innovative approaches to science education and public outreach.
   https://vivekdevulapalli07.github.io/website/tools/aberration-visualisation

2. Represented MPIE at the Bright World of Metals science slam event, 2023.
3. Organized and spoke at "Pint of Science," Düsseldorf, 2021 and 2023.
4. Represented MPIE at "Nacht-der-Wissenschaft (Science Night)," Düsseldorf, 2022.
5. Attended the **Alexander-von-Humboldt scholarship-funded** Science Communication Summer School in Berlin, 2021, resulting in a published *Declaration on the Future of Science Communication* presented to the German Parliament.
6. Editorial team member for the Max-Planck PhD-net scientific magazine, "Offspring," 2019-2020.

Awards and recognition

- Granted travel support by MecaNano cost action to give talk at Euromat 2025.
- Granted travel support by MecaNano cost action to give talk at MecaNano - General meeting, 2025.
- Granted travel support by European Microscopy Society for MC-2021, Vienna.
- **DAAD IIT-Masters scholarship** for a 7 month research stay in RWTH-Aachen, Germany, 2017.
- Scored **All India Rank – 76** in Graduate Aptitude Test in Engineering in Material Science, 2016.
- Scored **All India Rank - 4** in Metallurgical Thermodynamics exam conducted by NPTEL, 2016.
- Secured ARCI Hyderabad summer internship through first-place presentation at IIT - BHU, 2015.
- Awarded as **Eminent student of the branch** by Humanities department, NIT – Raipur, 2015.

References

Prof. Dr. Gerhard Dehm
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Prof. Dr. Christian Liebscher
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Prof. Dr. Johann Michler
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