

RONAK SHOGHI Dr.-Ing.

Research Group Leader | Data-Oriented Materials Modeling

Interdisciplinary Centre for Advanced Materials Simulation (ICAMS), Ruhr University Bochum, Germany

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RESEARCH PROFILE

Research group leader specializing in data-oriented materials modeling, with a focus on constitutive modeling of plasticity and microstructure–property relationships in metallic materials. Leads research on constitutive surrogate modeling, active learning for efficient data generation, and microstructure reconstruction within integrated modeling workflows, aiming to understand and predict material behavior across scales. Complementary research develops FAIR data workflows and infrastructure through metadata schemas, ontology alignment, and knowledge graphs, supporting data interoperability, traceability, and reuse in materials modeling.

ACADEMIC AND RESEARCH APPOINTMENTS

2026–present	Research Group Leader — Data-Oriented Materials Modeling Interdisciplinary Centre for Advanced Materials Simulation (ICAMS), Ruhr University Bochum, Germany Permanent position • Lead the group’s research in constitutive modeling of plasticity, active learning, microstructure reconstruction, integrated simulation workflows, and FAIR research data management. • Provide scientific and technical guidance to doctoral and postdoctoral researchers, co-supervise master’s theses, and independently supervise master’s research projects. • Deliver independent MSc-level teaching, with responsibility for course coordination, student assessment, and examinations.
Sep–Dec 2024	Visiting Research Fellow Cornell University, USA Investigated physics-informed neural networks for constitutive modeling of plasticity.
2021–2025	Doctoral Researcher / Research Assistant Interdisciplinary Centre for Advanced Materials Simulation (ICAMS), Ruhr University Bochum, Germany • Developed machine-learning yield functions for monotonic and cyclic plasticity, capturing anisotropic yielding and strain hardening. • Developed stress-space sampling and active-learning strategies for data-efficient constitutive modeling.

EDUCATION

2021–2025	Dr.-Ing. (PhD), Mechanical Engineering — <i>summa cum laude</i> Ruhr University Bochum, Germany Dissertation: Data-Oriented Modeling of Microstructure and Mechanical Properties of Polycrystalline Metals.
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2018–2021	MSc, Materials Science — grade 1.46 (German scale; 1.0 highest) Technical University of Darmstadt, Germany
2012–2017	BSc, Materials Engineering — grade 16.69/20 (Iranian scale; 20 highest) Iran University of Science and Technology, Iran

TEACHING

Ruhr University Bochum · MSc-level courses

2026–present	Computational Plasticity — Summer semesters Lecturer and examiner. Full responsibility for course design, organization, teaching, and examinations.
2026–present	Materials Modeling Lab — Summer and winter semesters Co-coordinator, lecturer and examiner. Co-organize the course, independently teach a laboratory component, and conduct examinations.
2024–present	Microstructure and Mechanical Properties — Summer semesters Tutorial and exercise instructor. Teach numerical tutorials and exercise classes accompanying the lectures.
2024–present	Fundamentals of Materials Physics — Winter semesters Exercise instructor. Teach exercise classes accompanying the lectures.

ACADEMIC SUPERVISION AND RESEARCHER GUIDANCE

2025–present	Postdoctoral research — supervision Responsible for supervising one postdoctoral researcher on FAIR data infrastructures and semantic knowledge representation for micromechanical modeling, including ontologies, knowledge graphs, and interoperable materials databases.
2024–present	Doctoral research — co-supervision Co-supervise one doctoral researcher on realistic 3D microstructure reconstruction and interoperable data frameworks for capturing microstructure evolution and supporting integrated micromechanical simulation workflows.
2026–present	Master’s theses — co-supervision and examination Co-supervise two ongoing MSc theses in data-oriented materials modeling and serve as the appointed second examiner.
2026	Master’s project work — independent supervision and examination Independently supervised and served as examiner for two master’s project works.
2022–2025	Master’s theses and project work — technical guidance Provided scientific and methodological guidance for three project works and two MSc theses.

RESEARCH SOFTWARE AND OPEN SCIENCE

MetadataSchema — **developer.** Modular metadata schema for documenting microstructure-sensitive mechanical data and simulation workflows. [MiMeDat](#)

pyLabFEA and Kanapy — **contributor.** Open-source tools for finite-element material modeling and 3D microstructure generation. [pyLabFEA · Kanapy](#)

Research data. Publicly available datasets supporting reproducible research in data-driven constitutive modeling. [Zenodo](#)

PEER-REVIEWED JOURNAL PUBLICATIONS

- 2026 **Shoghi, R.;** Morand, L.; Helm, D.; Hartmaier, A.
Diversity-aware batch-mode active learning for efficient sampling in data-driven constitutive modeling.
Computational Materials Science, 274, 114979. [DOI](#)
- 2026 **Shoghi, R.;** Hartmaier, A.
A machine learning-based constitutive model incorporating history-dependent features for cyclic plasticity.
Computer Methods in Applied Mechanics and Engineering, 448, 118524. [DOI](#)
- 2025 **Shoghi, R.;** Hartmaier, A.
A workflow-centric approach to generating FAIR data objects for computationally generated microstructure-sensitive mechanical data.
Advanced Engineering Materials, 27, 2401876. [DOI](#)
- 2024 **Shoghi, R.;** Morand, L.; Helm, D.; Hartmaier, A.
Optimizing machine learning yield functions using query-by-committee for support vector classification with a dynamic stopping criterion.
Computational Mechanics, 74, 447–466. [DOI](#)
- 2024 **Shoghi, R.;** Hartmaier, A.
A machine learning constitutive model for plasticity and strain hardening of polycrystalline metals based on data from micromechanical simulations.
Machine Learning: Science and Technology, 5, 025008. [DOI](#)
- 2022 **Shoghi, R.;** Hartmaier, A.
Optimal data-generation strategy for machine learning yield functions in anisotropic plasticity.
Frontiers in Materials, 9, 868248. [DOI](#)

SELECTED CONFERENCE PRESENTATIONS

- Oct 2026 **ICTP 2026, Jeju Island, South Korea** — Machine-learning constitutive modeling for cyclic plasticity.
- May 2025 **EUROMECH Colloquium 656, Gothenburg, Sweden** — History-dependent machine-learning constitutive modeling.
- Sep 2024 **MSE 2024, Darmstadt, Germany** — Microstructure-sensitive machine-learning models for plasticity and strain hardening.
- Dec 2023 **MRS Fall Meeting, Boston, USA** — Machine-learning plasticity models based on crystal-plasticity simulations.

ACADEMIC SERVICE AND PROFESSIONAL MEMBERSHIPS

Peer review. European Journal of Mechanics – A/Solids; International Journal of Solids and Structures; Scientific Data; Machine Learning: Science and Technology.

Symposium organization. Confirmed co-organizer of MS-1, “Recent Advances in Micromechanical Modeling of Deformation in Metallic Materials,” ICoNSoM 2027, Hangzhou, China (forthcoming).

Memberships. Deutsche Gesellschaft für Materialkunde (DGM); German Association for Computational Mechanics (GACM); Gesellschaft für Angewandte Mathematik und Mechanik (GAMM); National Research Data Infrastructure for Materials Science and Engineering (NFDI-MatWerk).