



Opening, Max-Planck-Institut für Eisenforschung in Düsseldorf, Germany

OPEN POSITION (PhD or Postdoc) in **Crystal Plasticity Simulation**.

The position is part of the project “Phase-field-based chemo-mechanical models for phase transitions and dislocation-microstructure interaction in metallic alloys with application to κ -carbides” within the DFG priority programme “Strong coupling of thermo-chemical and thermo-mechanical states in applied materials” (SPP 1713).

The project is concerned with the formulation, comparison and application of phase-field-based chemo-mechanical models for metallic alloys undergoing phase transitions, dislocation-mediated finite deformation, and failure. On the methodological side, this is based on generalization and further development of approaches such as WBM (Wheeler-Böttlinger-McFadden) and KKS (Kim-Kim-Suzuki) for chemical homogenization to large-deformation chemo-mechanics. These will be compared with existing chemo-mechanical models for small deformation in the context for example of benchmark simulations and the modelling of excess interface energy. In addition, models based on both artificial and physical (i.e., sublattice- and element- site-fraction-based) chemical order parameters will be extended to finite-deformation chemo-mechanics, facilitating coupling to CALPHAD. Likewise, the modelling of dislocation processes and failure will be included via the generalization of phase-field micro-elasticity for defects and phase-field fracture to finite deformation. Principle applications of the proposed method and model developments include the modelling of precipitation, dislocation-solute interaction, and dislocation-precipitate interaction. Of particular interest are Fe-Mn-C-Al-based low-density steel κ -carbides.

Applicants: The candidate should have a master degree in materials science or physics as well as a strong background in physical metallurgy or solid state physics. Programming skills are beneficial. Excellent English skills are mandatory. We are an equal-opportunity employer and offer an international, ambitious environment for basic research-oriented candidates who want to perform competitive and cutting-edge research. Salary is determined by the TVöD, level 13. We invite excellent candidates (materials science, physics, engineering) to send a scientific CV including full course and grade documentation as well as transcripts (including grade scale), concise specific motivation letter, publications, at least 2 letters of reference and 2 further names & contacts of scientists as references to

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