

Open position for PhD Candidate (m / f / d):

Analytical electron microscopy on the next generation of high temperature materials.

There is an opening for a PhD candidate researcher position as part of the research training group (RTG) MatCom-ComMat at KIT, Germany. The PhD candidate will be part of the research group **MNM** (microscopy of nanoscale structures & mechanisms) guided by tenure track Professor Dr.-Ing. Yolita Eggeler, which is part of KIT's central laboratory for electron microscopy (**LEM**).

As of November / December 2021, we are looking for a PhD candidate (m / f / d) who fits well into our team. The main scope of the research training group (RTG) relates to the development, characterization and modelling of novel, revolutionary multi-phase composite systems capable of withstanding temperatures substantially beyond 1300 °C and harsh environmental conditions (e.g., oxidative, corrosive, erosive atmospheres) as far as mechanical behavior, environmental resistance and durability are concerned. (RTG Information see: <https://www.iam.kit.edu/wk/english/rtg2561.php>)

Within this PhD appointment analytical *ex* and *in situ* transmission and advanced scanning electron microscopy will be applied to characterize challenging Mo-Ti-Si high temperature material systems. Ti-rich alloys like Mo-20.0Si-52.8Ti (at.%) form quasibinary eutectic microstructures, and are produced by our KIT-IAM-WK collaborators. A first glance of the microstructure is revealed in Figure 1, [1, 2]. After solidification Mo₃Si appears first and subsequently decomposes in an eutectoid reaction. We are specifically interested in the physical nature of the interfaces and the eutectoid front (atomic structure and chemical composition), and, possible interface crystal defects [3]. A special effort will be made to study eutectoid decompositions with the help of *in situ* heating experiments in the electron microscopes, reference [3].

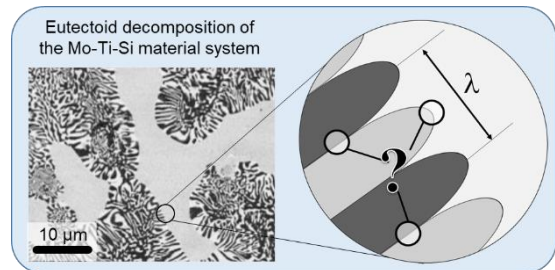


Figure 1: Objectives of the PhD appointment. Investigation of structural evolution, crystal defects and interfaces in the Mo-Ti-Si material system. Microstructure images adapted from reference [2].

Requirements: We are looking for **highly motivated** graduates with a **master degree in physics, materials science, mechanical engineering or related fields**. (For international researchers: Please ensure that your master degree is equivalent to a German master degree). We are looking for someone who has a **background in electron microscopy**. The candidate should have **good english and/or german communication and scientific writing skills**. We seek for someone with a **keen interest in applying transmission electron microscopy to an important class of high temperature materials and alloys** and who is willing to contribute to the scientific objectives of our MNM team.

Funding: A scientific E13 staff position (f/m/d) is offered to candidates who aim for a doctor degree (German PhD degree). Funding is secured **for 3 years**. The position also allows taking part in advanced training courses offered by the RTG MatCom-ComMat at KIT for young scientists (f/m/d). We strive to fill the jobs with female and male employees as evenly as possible and would be particularly happy to receive applications from young female researchers. With appropriate suitability, severely disabled people are given priority.

Application Procedure: Please send your **application as one PDF-file to yolita.eggeler@kit.edu by September 30, 2021** (cover letter explaining your electron microscopy background and why you are interested in working on high temperature materials, curriculum vitae, certificates/ diplomas translated into the german grading system, pdf copy of your master's thesis (preliminary versions welcome) and other relevant documents, if applicable). Please contact TT.Prof. Yolita Eggeler, if you have questions about the project, the possibilities of your development or the type of work and the MNM in general.

For further information see our homepage: <https://www.lem.kit.edu/MNM-Gruppe.php>



[1] S. Obert, A. Kauffmann, and M. Heilmaier, Characterisation of the oxidation and creep behaviour of novel Mo-Si-Ti alloys, *Acta Mater.* 184 (2020), pp. 132–142.

[2] D. Schliephake, A. Kauffmann, C. Xiangna, C. Gombola, M. Azim, B. Gorr, H.J. Christ, M. Heilmaier, Constitution, oxidation and creep of eutectic and eutectoid Mo-Si-Ti alloys, *Intermetallics* 104 (2019), pp. 133–142.

[3] Y.M. Eggeler, D. Kubacka, P. Pichler, M. Wu, and E. Spiecker, *Intrinsic nano-diffusion-couple for studying high temperature diffusion in multi-component superalloys*, *Scr. Mater.* 192 (2021), pp. 120–124.