



The Institute of Micro- and Nanostructure Research (IMN, www.em.tf.fau.de) & Center for Nanoanalysis and Electron Microscopy (CENEM, www.cenem.fau.de) at the University of Erlangen-Nürnberg offer a

PhD position / PostDoc position

for

Analytical *in situ* TEM studies of Segregation Kinetics in Superalloys.

Research and development of superalloys, the only material suitable for turbine blades serving at the extreme environment of high-temperature and stress, has elevated the performance and efficiency of jet engines over the last decades. In recent years, the local chemical composition of dislocations and planar defects formed upon high temperature creep in superalloys attracted particular attention. It was shown that solute segregation can either assist plastic deformation by lowering planar fault energies or prevent further growth of defects through local phase transformations. Co-base superalloys are particularly prone to formation of planar faults enabling detailed investigations of segregation phenomena. Despite extensive TEM studies reported in the recent literature, the kinetics of segregation and the relevant diffusion paths have not been completely elucidated yet.

At IMN we have studied the formation of planar defects and their local chemical composition in Co-base superalloys using a combination of aberration-corrected STEM, conventional TEM, large angle CBED and energy-dispersive X-ray microanalysis (EDXS). The investigations have been carried out within the framework of the Collaborative Research Center SFB-TR 103 "From atoms to turbine blades - a scientific basis for a new generation of single crystal superalloys" (www.sfb-transregio103.de), one of the largest collaborative projects in the field of superalloy research worldwide. Together with our project partners complementary atom probe tomography (APT) and modelling studies have been carried out. In another part of the project, we are currently using analytical *in situ* TEM techniques to study diffusion of alloying elements in the complex microstructure of superalloys.

In order to bring these two research directions together and gain insight into both the atomic structure and segregation kinetics of creep-induced defects, we are seeking a highly motivated PhD student or PostDoc for analytical and *in situ* TEM. The applicants should have a master's degree / PhD in materials science, physics, chemistry or a related discipline. PostDoc applicants are expected to have several years of experience in applying high-resolution analytical TEM to solve materials-related problems.

The IMN, a research institute of the Materials Science Department, explores the advanced capabilities of CENEM, a well-established microscopy center and user facility at the University of Erlangen-Nürnberg. The CENEM hosts a number of state-of-the-art electron microscopes, among these a double-corrected monochromated (S)TEM Titan Themis³ 60-300 equipped with a Super-X detector and a GIF Quantum ERS system for advanced nanoanalytics as well as a FIB Helios Nanolab 660 equipped with versatile add-ons for sophisticated sample preparation and *in situ* studies.

We offer working in a great team and expanding electron microscopy group within a vibrant scientific environment. Scientific discussion, the process of creating own ideas and the possibility to implement them are key elements of our research philosophy.

The salary is according to German standard (75% E13 TV-L for PhD, 100% E13 TV-L for PostDoc). The PostDoc position will be for initially 2 years. **The position will be filled as soon as possible.**

The University of Erlangen-Nürnberg is interested in increasing the share of women in research and teaching positions and therefore explicitly encourages female candidates to apply.

Physically disabled applicants receive favorable consideration when equally qualified.

Please send your application until 30 November 2019 by e-mail to Prof. Erdmann Spiecker (Erdmann.Spiecker@fau.de) and Dr. Stefanie Rechberger (Stefanie.Rechberger@fau.de).