Open PhD position at KIT – Institute for Applied Materials

Characterisation and modelling of protective coatings for plasma-facing components in future fusion power plants

The Institute for Applied Materials – Mechanics of Materials and Interfaces (IAM-MMI) at the Karlsruhe Institute of Technology (KIT) strives for a fundamental understanding, prediction and optimisation of mechanisms responsible for the degradation of advanced functional material systems. Our material portfolio comprises, among others, materials required for the energy transition. Within the division Mechanics of Materials 2 (WM2), we develop protective coatings for the first/inner wall of future fusion power plants. The wall needs to withstand thermal peak loads as well as erosion by high-energy particles from the fusion plasma. This can be achieved by a protective tungsten coating, linked to the steel wall by a functionally graded material: Several interlayers of mixed tungsten/steel composition and increasing tungsten content. The IAM-MMI is offering a PhD position in materials science at WM2. The focus of this position is the characterisation and modelling of tungsten/steel functionally graded materials.

Tasks to be carried out include:
- Thermo-mechanical experiments on single interlayers and mechanical characterisation of the interface strength between coating and substrate
- Finite element modelling with newfound properties to predict the coating’s behaviour and to further improve its design
- Formulation of a damage model in order to predict failure probabilities while taking into account variation of production quality.
- Model verification with new coatings, manufactured in cooperation with external partners
- Presentation and publication of the results in scientific meetings and peer-reviewed journals.

Requirements
- Candidates must hold a master degree with focus on materials science, physics, mechanical engineering or a similar subject
- Basic understanding of mechanical testing is required
- Prior experience in finite element simulation and damage modelling is beneficial

Besides a state-of-the-art laboratory at the IAM and an inclusive, caring as well as supportive atmosphere, we can offer a three years lasting PhD contract. We warmly welcome applicants of different cultures, ethnicities and beliefs – indeed this very diversity is vital to our success, it is fundamental to our values and enriches life at the institute.

The call for applications is open until filled.

For more information, do not hesitate to contact either one of us.

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