Research Neutron Source
Heinz Maier-Leibnitz (FRM II)
Technical University of Munich

The Technical University of Munich operates the Research Neutron Source Heinz Maier-Leibnitz (FRM II) in Garching near Munich as one of the most powerful and modern neutron sources worldwide. As a service facility for science and a service provider for industry, we occupy a leading position in the field of research with neutrons and their technical use.

Starting spring 2022, the working group “High Density Nuclear Fuels” at the research neutron source Heinz Maier-Leibnitz (FRM II) is looking for a:

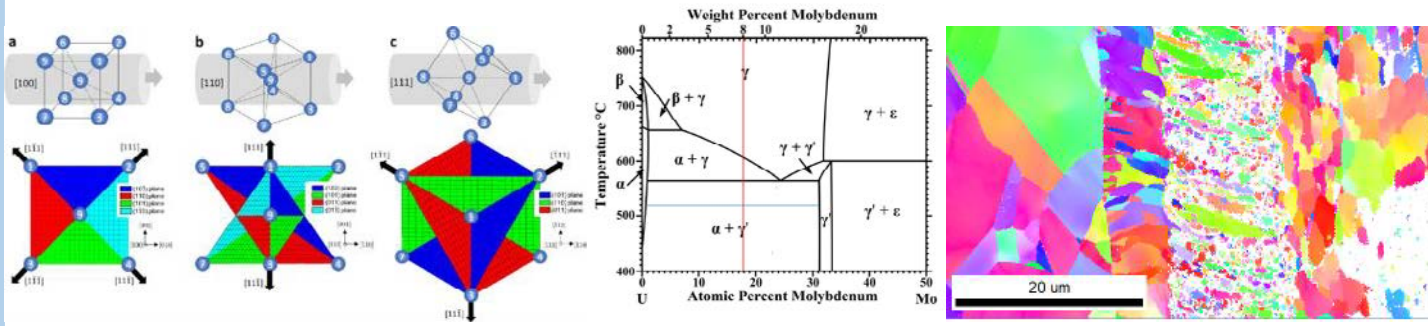
B.Sc. student - M.Sc. student - working student - internship (m/f/d)
Physics - Engineering - Materials science - Comparable studies

Epitaxial growth of single crystalline U or U-Mo layers with PVD

Metallic Uranium shows a rich phase diagram. Elemental Uranium solidifies at 1135°C in the bcc ɣ-phase to transform upon cooling first to β-Uranium (776°C) and finally (555°C) to the hexagonal α-Uranium, which is the stable phase at room temperature. We intend to measure the phonon dispersion of ɣ-U, which ultimately needs single crystals, eventually as thin epitaxial films. We foresee two alternatives to reach this goal. Either it is possible to grow ɣ-U by physical vapor deposition (PVD) on a specially selected single crystalline substrate, which forces the Uranium to condense on the substrate in bcc structure or alternatively about 8 wt% Mo are alloyed to U, which stabilizes the high temperature ɣ-U to room temperature and epitaxial growth by PVD. The latter one is straight forward with the draw back to compromise by alloying a further metal, i.e. Mo.

Therefore, the scope of this project is to investigate how single crystalline U or U-Mo layers can be deposited by means of Physical Vapor Deposition (PVD). The analytical procedure will involve X-ray Diffraction (XRD), Electron Backscatter Diffraction (EBSD) and Scanning Electron Microscopy (SEM) of the samples for single crystal verification. The practical work will also include sample preparation and polishing techniques.

The tasks typically involve working in radiation protection areas with open handling of radioactive materials such as uranium. The high security standard of FRM II generally requires a security clearance according to the German atomic law.



In case of an online application please send the documents compiled in a PDF file.

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