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:

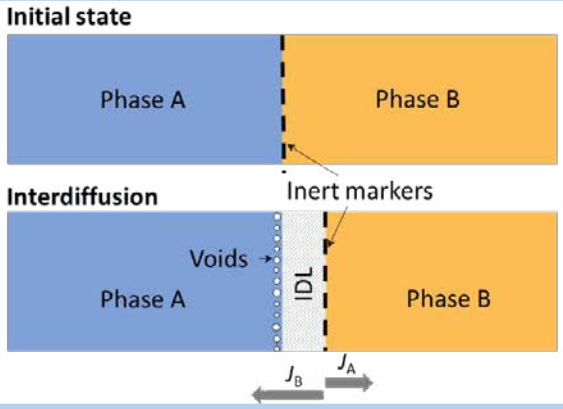
M.Sc. Student - Working Student - Internship (m/f/d)
Physics - Engineering - Materials science - Comparable studies

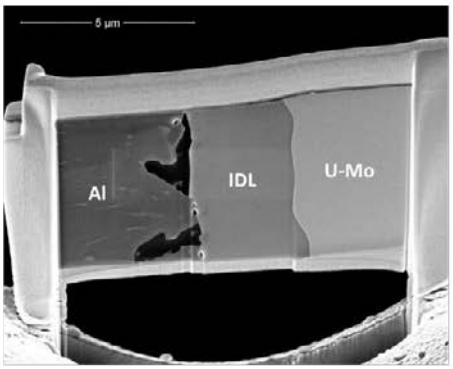
Study of Kirkendall effect in U-Mo/Al layer systems

The research working group “High Density Nuclear Fuels” at the research reactor FRM II is working on the qualification of newly-developed high-density nuclear fuels in Europe. The most promising candidates are a metallic uranium-molybdenum alloy fuel (U-Mo) or high-density uranium silicide (U_3Si_2), both using aluminum-based cladding. Therefore, scientists in the fields of physics, chemistry, engineering, physical technology and computer science are working intensively together on fuel fabrication technologies, the determination of material properties as well as the irradiation behavior of such fuels.

The past test irradiations of U-Mo/Al fuels showed an unsatisfying swelling under irradiation. This is mainly caused by the growth of an interdiffusion layer (IDL) between the two materials. Initial fission gas accumulation sites are possibly located in nm-sized voids formed due to the unequal diffusion rates of the two species (Kirkendall effect). This effect can be observed for example by placing insoluble markers at the interface, which move relative to the interface. The applicant for this topic is supposed to prepare U-Mo/Al bilayer samples with selected inert markers, conduct ion irradiation or heating experiments to activate the atomic diffusion, and perform scanning electron microscopy/ energy-dispersive X-ray spectroscopy (SEM/ EDX) analyses. The goal of this study is to obtain an in-depth understanding of the fission gas accumulation and growth in U-Mo/Al fuels.

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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