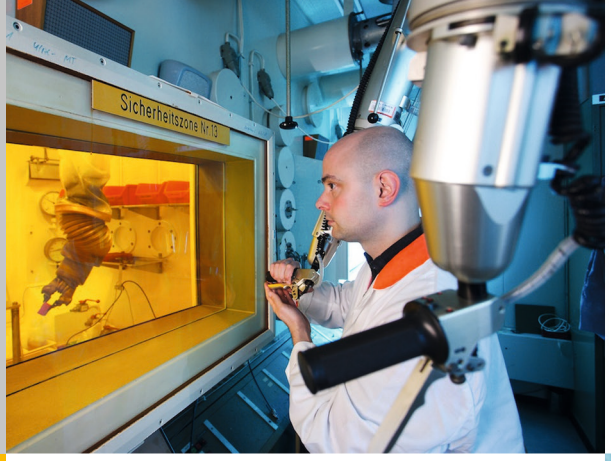

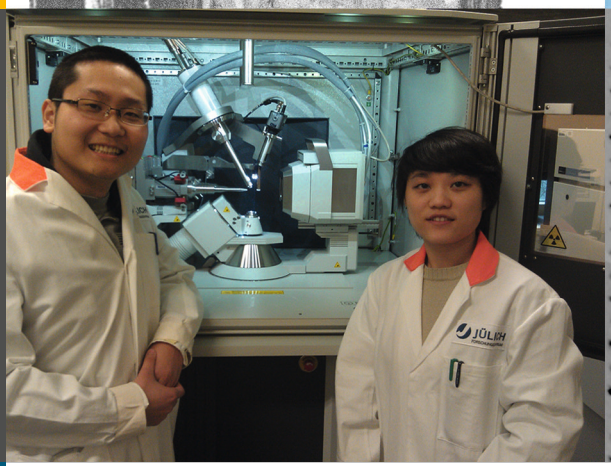

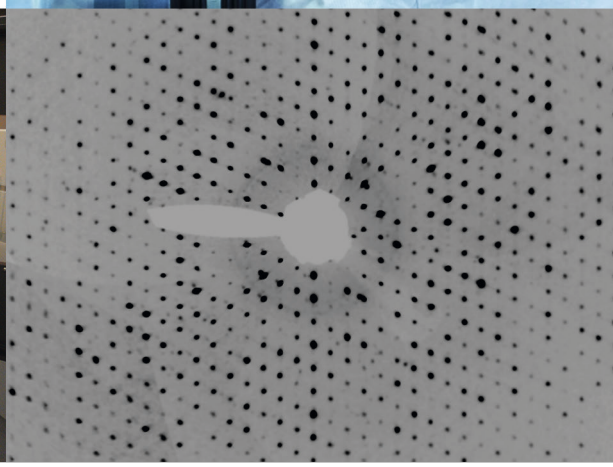

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Institute of Energy and Climate Research
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Report 2011/2012

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M. Klinkenberg, S. Neumeier, D. Bosbach (Editors)

JÜLICH
FORSCHUNGSZENTRUM

Forschungszentrum Jülich GmbH
Institut für Energie- und Klimaforschung (IEK)
Nukleare Entsorgung und Reaktorsicherheit (IEK-6)

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Institute of Energy and Climate Research
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The Nuclear Waste Management section of the Institute of Energy and Climate Research (IEK-6) performs fundamental as well as applied research and development for the safe management of nuclear waste covering issues from the atomic scale to the macroscopic scale of actual waste packages and waste compounds/materials.

After the reactor accident in Fukushima (Japan) in 2011, the German Government decided to shut down immediately eight of 17 nuclear power plants. In the following, the German parliament decided with support of a broad societal consensus to terminate nuclear energy production in Germany, with the last nuclear power plant to be shutdown in 2022. Projections indicate that about a total of 17,200 tons of spent nuclear fuel will be generated by 2022. About 300,000 m3 of low and intermediate level mostly cementitious waste are forecasted to accumulate after shutdown and decommissioning of all German nuclear power plants. The safe management and ultimately the safe disposal of radioactive waste remain grand scientific, political and societal challenges to be met in the next decades. IEK-6 research addresses a number of challenges arising from these new constraints.

IEK-6 research with respect to the **long-term safety of nuclear disposal** includes work on spent nuclear fuel corrosion and the formation of secondary phases – the radio(geo)chemistry of the deep geological repository nearfield, thus contributing to the scientific basis of the safety case. In order to study **innovative waste management strategies** IEK-6 research groups are also focusing on partitioning of actinides and ceramic waste forms. The research programme is supported by a strong **"structure research"** group covering the field of solid state chemistry, crystallography and computational science to model actinide bearing compounds. Application oriented waste management concepts for special categories of radioactive waste are developed by integrating (1) the development of **non-destructive essay techniques**, for which IEK-6 is well known for decades and (2) **waste treatment procedures**. Furthermore, (3) some of this research is guided by the **product quality control group for radioactive waste (PKS)** which is operated by IEK-6 on behalf of the Federal Office of Radiation Protection (BfS) since 1987, to qualify radioactive waste packages in Germany. The IEK-6 **nuclear safeguards group** coordinates on behalf of Federal Ministry of Economics and Technology (BMWi) the German contribution to the **IAEA safeguards support programme**. JÜLICH will become a member of the **IAEA network of analytical laboratories** (qualification process started in 2013) by combining the analytical capabilities of three units (IEK-6, ZEA-3 & S) in JÜLICH. A **scientific collaboration with the IAEA safeguards laboratories** has been established to develop actinide bearing reference materials for particle analysis within the framework of nuclear forensics.

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