First Radioactive Experiments Performed at the INE-Beamline at ANKA

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The first radioactive experiments were recently completed at the INE-Beamline at the synchrotron source ANKA (Angstromquelle Karlsruhe). The INE-Beamline was constructed by the Institut for Nukleare Entsorgung (INE) at the Forschungszentrum Karlsruhe (FZK), Germany. Professor Thomas Fanghдnel, director of INE, comments, "This is a big step forward for actinide research especially in Europe." The unique aspect of the INE-Beamline is its close proximity to INE's active laboratories on the FZK site, providing all necessary infrastructure for working with radioactive samples, and equipped with state-of-the-art spectroscopic (notably laser-based) and analytical techniques. This is singular in all of Europe.

The INE-Beamline is dedicated to actinide research, with emphasis placed on spectroscopic speciation related to nuclear waste disposal. The set-up and instrumentation at the INE-Beamline will allow investigators to gain a better understanding of molecular processes determinant in the fate of radionuclides released from repository waste, notably the actinides. Such information is essential to ensure sound long term safety assessment of proposed repositories.

A number of methods (XAFS, surface sensitive and spatial resolved techniques) are possible on the same sample at the INE-Beamline, with X-ray energies from 2.4 keV (S K edge) to 23.2 keV (Rh K edge). Research on nuclides with activities up to 10^6 times the exemption limit inside a safe and flexible containment within two layers of protection is possible. This amount of activity allows experiments on samples

containing, e.g. more than 25 mg long-lived nuclide 237-Np, 242-Pu, 243-Am, or 248-Cm. A special protocol for working with radioactive samples at the INE-Beamline exists and must be adhered to. Standardized sample holders for transmission and fluorescence measurements on radioactive and non-radioactive samples, as well as specialized sample chambers for, e.g. grazing incidence investigations, are available.

Installation of beamline components was completed in October 2003. Commissioning of the INE-beamline officially began in January 2004 and first X-ray absorption spectra were recorded the following August. The first spectrum (Am L3 edge XAFS) of a radioactive sample containing ~80 µg Am-243 sorbed onto amorphous Fe(III) oxy/hydroxide was recorded on February 17, 2005, the same day all formal requirements for the INE-Beamline license for working with radioactivity were fulfilled.

Source: Angstromquelle Karlsruhe (ANKA)