Contribution ID: **59** Type: **Poster**

In-beam activation analysis facility at MLZ

Tuesday 19 July 2016 16:50 (2h 40m)

Whenever neutrons are absorbed in atomic nuclei, mostly gamma photons, sometimes charged particles are emitted. Detecting them offers a set of nuclear analytical methods which are utilized in characterizing high-purity, or thin-layered materials also used in energy technology. Prompt Gamma Activation Analysis (PGAA), i.e. the technique based on the emission of gamma photon emitted during the irradiation, is mainly used for the determination of the light elements, typically for analyzing the major components of the sample. It offers a unique method for the analysis of hydrogen (or humidity/water content) down to ppm levels, and that of boron down to ppb levels. Neutron Activation Analysis (NAA), i.e. when the delayed gamma radiation is acquired, is mainly used for the determination of trace elements in various matrices, e.g. the impurities in silicon. When combining the two, both the matrix composition and the trace-element content can be determined accurately.

At MLZ, the PGAA facility has been reconstructed to enable both activation analyses at the cold neutron beam: in-beam activation analyses which combines the advantages of both nuclear analytical methods. Because of the highly different samples typically measured at MLZ, the irradiation and counting facilities need to be changed rapidly and flexibly, so that the detector efficiencies match the actual activation conditions. The reconstructed facility is presented.

It will also make possible to accommodate another nuclear analytical tool, neutron depth profiling (NDP), which has not yet been available at MLZ. Charged particles (alpha, triton, proton at various energies) are emitted from a set of light nuclei (Li, B, N etc.), whose distribution can be investigated with NDP in thin layers up to a few micrometers in thickness. Processes like charge-discharge of prepared Li-ion batteries can also be monitored in situ.

A few applications will also be presented like the analysis and the determination of the distribution of H and B in silicon ingots used in solar-cell production.

Author: REVAY, Zsolt (Physics Department, Technische Universitaet München, Germany)

Co-authors: Mr STIEGHORST, Christian (University of Mainz - Institute of Nuclear Chemistry); Dr KLESZCZ, Krzysztof (IFJ PAN - The Henryk Niewodniczanski Institut of Nuclear Physics Polish Academy of Science); KUDEJOVA, Petra; THIEL, Stefan (???)

Presenter: REVAY, Zsolt (Physics Department, Technische Universitaet München, Germany)

Session Classification: Poster Session

Track Classification: Advanced and Complementary methods