Contribution ID: **257** Type: **Poster**

NORMA: A new PGAI-NT setup at the Budapest Research Reactor

Monday 17 September 2012 17:30 (1h 30m)

Efforts are being made at laboratories worldwide to develop Prompt Gamma Activation Analysis (PGAA) towards a position-sensitive technique. It was proven earlier that the complete scanning with a few-mm-resolution is only practical on small objects due to constrains of experiment time and neutron flux. A feasible alternative is the combination of neutron radiography with prompt gamma activation analysis. Radiography, or even a full tomography of the complex sample, as a first step, can be completed in minutes, but often provides enough information to set up regions of interests inside the sample. The detailed element analysis by PGAA is carried out then only at these spots, saving substantial beam time. This novel combination of methods is best used for real samples which consist of a few homogeneous parts.

The first ever pilot instrument for this purpose was installed at the Budapest Research Reactor in 2007 and has been presented at the NRC7 conference. The technique proved its usefulness and raised enough interest in the user community to continue the efforts. Based on these experiences the first permanent radiography-driven PGAI facility, NORMA (Neutron Optics and Radiation Measurement for element Analysis) was constructed and put into operation in the first months of 2012.

Its specifications supersede the pilot setup in every aspect. The sample chamber has now dimensions of 20×20×20 cmˆ3. By removing one or more side panels, larger objects up to 5 kg weight could be analyzed (such as a sword, vase, stones, etc.). Samples can also be loaded to the chamber manually from the top side. The positioning table has a nominal travel distance of 200 mm. The gamma radiation is detected with a Compton suppressed system, that consists of a central Canberra GR2318/S HPGe detector surrounded by a Bismuth Germanate (BGO) scintillator made by Scionix. The cylindrical and exchangeable lead collimators can be mounted into a socket of the 10-cm thick lead shielding. The gamma events are collected with a Canberra DSP-2060 digital signal processor, in anti-Compton mode. The imaging system comprises a 100 um thick Li-6/ZnS scintillator, a silver-free quartz mirror set in 45 degree to the neutron beam and a cooled ANDOR iKon-M CCD camera (16-bit ADC and 1024×1024 pixel resolution), mounted to a light tight aluminum housing. Integrated data acquisition software operates the moving table, the gamma-ray spectrometer and the camera.

The commissioning has just recently been completed, and the facility became open to the international user community through the EU FP7 NMI3, CHARISMA and EFNUDAT access programs. The first results of this non-destructive technique will be presented here from various fields of applications, such as archaeometry, safeguards and material science.

Primary author: Dr SZENTMIKLÓSI, László (Centre for Energy Research, Hungarian Academy of Sciences)

Co-authors: Dr BELGYA, Tamás (Centre for Energy Research, Hungarian Academy of Sciences); Dr KIS, Zoltán (Centre for Energy Research, Hungarian Academy of Sciences); Dr RÉVAY, Zsolt (Centre for Energy Research, Hungarian Academy of Sciences)

Presenter: Dr SZENTMIKLÓSI, László (Centre for Energy Research, Hungarian Academy of Sciences)

Session Classification: Poster Session

Track Classification: Radioanalytical Chemistry and Nuclear Analytical Techniques