



Contribution ID: 129

Type: Verbal

New cultural heritage projects at the high-flux PGAA instrument in Garching

Wednesday, 14 May 2014 11:15 (15 minutes)

In the second half of 2013, three independent projects connected to cultural heritage objects emerged at the PGAA facility at FRM II: analysis of clay crucibles for provenance study, determination of chlorine content in rusted iron artefacts and minor element analysis of bronze coins with increased precision for selected elements like e.g. Pb, Zn, Fe or Sn. For all three projects, the high intensity cold neutron flux is essential: either many samples should be measured during a short period, or the low-energy gamma rays should be attenuated to get higher yield for specific high energy gamma rays. In the case of the Chlorine project, about 60 samples were measured in less than 5 days and interesting conclusions could be drawn already.

In this presentation, not only the projects will be discussed but mostly the potential of the high-flux PGAA for valuable objects, like cultural heritage artefacts or micrometeorites of less than 1 mg weight. Also, scanning of the surface of large objects will be presented as well as scanning objects by a collimated pencil beam of 2 mm x 2 mm giving insight into elemental composition of selected parts of given objects. This information can be combined with Neutron Tomography, which can be also run at the PGAA instrument. Exemplary experiments will be presented to demonstrate the diverse applications of the PGAA facility.

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Session Classification: Nuclear Analytical Methods 3

Track Classification: Nuclear Analytical Methods