

# High Flux Prompt Gamma Activation Analysis: a non-destructive technique for determination of elemental composition of cultural heritage objects

*Tuesday, 10 September 2013 15:20 (30 minutes)*

Possible applications of the PGAA based techniques for cultural heritage objects will be presented in this overview talk. The (n,gamma) capture reaction is used for non-invasive determination of the elemental composition in samples while irradiated by high intensity flux of cold neutrons. Generally, the PGAA method is used in applications like archaeometry and archaeology, geology, environmental science, new material research...

In frame of the Ancient Charm project we have performed a feasibility study for 3D mapping of elemental composition of archaeological objects up to size of ca. 5cm x 5cm x 5cm. For that purpose, low-resolution neutron tomography (NT) set-up was combined with the spatially resolved PGAA technique called Prompt Gamma Activation Imaging (PGAI). With PGAI, the neutron beam is collimated to a pencil beam of 2 mm x 2 mm and the detector sees only a 2 x 2 x 2 mm<sup>3</sup> voxel of the sample. While scanning the object in the pencil neutron beam, the elemental composition can be given in dependency on the position in the sample. The gained position information is then compared and combined with the internal structure information of the object determined by the neutron tomography 3D image which was performed before the actual PGAI scan. A large variety of experiments at the PGAA instrument at FRM II and some prominent results will be described and discussed. Possible ways how to improve e.g. the detection limits for better determination of trace elements will be proposed.

## Summary

An overview talk explaining the PGAA method and PGAA based techniques. Some examples of PGAA experiments on archaeological objects will be given.

**Primary author:** KUDEJOVA, Petra

**Co-authors:** SOELLRADL, Stefan; REVAY, Zsolt

**Presenter:** KUDEJOVA, Petra

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