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Introduction

Neutron tomography has recently found new applications in many different fields like for example in Biology, Medicine, Geology, Archaeology and Cultural Heritage. One of the reasons is the fast development in digital image recording and processing, which enables the computation of tomographic reconstructions from high-resolution images at a reasonable timescale. The development of new detectors with better signal-to-noise characteristics and faster read-out electronics has allowed the overcoming of some of the spatial and time resolution limitations of conventional neutron radiography and tomography. Nevertheless the quantification of neutron tomographic data is a challenging task in many cases. The diverse experimental conditions at different facilities (beam spectrum, collimation, background, etc.) hinder the distinct relation between attenuation coefficient and single material. In this case complementary methods should be used for determination of the chemical composition in multicomponent samples which can be related later to the obtained matrix of attenuation coefficients from the neutron tomographic measurement.

Experimental facility:

The analytical chemistry provides various methods which can map the chemical composition on the sample's surface non-destructively (XFR, LA-ICP-MS) or destructively analyse a small part of the sample (ICP-MS and ICP-AES). The application of the non-destructive chemical analytical methods before the exposure of the sample to thermal neutrons will help the detection of critical elements (e.g. Co, Ag, etc.) which have long lived radionuclides and could be a problem for investigation of valuable cultural heritage samples from museums and private collections. The ICP – techniques are already well established for investigation of archaeological materials providing accurate information for a variety of materials and elements. Although ICP-MS and ICP-AES are destructive methods they work with samples of 0.4 – 1 mg which quantity may be taken from most artefacts and used in the standardization experiments. LA-ICP-MS besides non-destructive is also an acknowledged technique for imaging. EDXRF is widely used in archaeometric investigation. Time table with the schedule of the CRP is summarised in following table.

Main objective	Sub objectives	Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Quantification of neutron tomography data	Harmonization of ICP-MS; ICP-AES; LA-ICP-MS –analysis of bronze CRM	X	X	X									
	Analysis of bronze CRMs by neutron tomography (Helmholz Zentrum Berlin)			X	X								
	Comparative evaluation of results				X								
	Analysis of bronze artefacts			X	X	X	X						
	Progress report			X									
	Standardization of non destructive approaches (neutron tomography and LA-ICP-MS) for investigation of metal artefacts					X	X	X					
	Investigation of various metal based finds							X	X	X	X	X	
	Progress report							X					
	Scientific communications										X	X	
	Final report												X