

## **APPLICATION OF X-RAY EMISSION TECHNIQUES IN CHARACTERISATION OF OBJECTS OF CULTURAL HERITAGE**

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X-ray emission techniques play important role in the cultural heritage area. They provide information about chemical composition of an object upon bombardment of its surface with electrons, ions, or electromagnetic radiation. Their useful features include non-destructiveness, multielemental capability, and high sensitivity for inorganic components. Especially widely used is the X-ray fluorescence technique (XRF). It utilizes electromagnetic radiation generated by X-ray tubes or radioisotope sources. XRF equipment is relatively simple as compared to charged particle-based spectrometers like electron probe micro-analysis/scanning electron microscope (EPMA/SEM) or ion beam analysis techniques. It can be easily adapted for *in situ* measurements. A portable XRF spectrometer has been constructed. The description of the spectrometer and examples of its application will be given. The key features of the portable XRF system are the use of polycapillary optics to reduce the beam spot diameter below 200 micrometers and a vacuum chamber attachment to enable detection of low atomic number elements such as Mg, Al, Si, P, S, and Cl. The spectrometer was applied for chemical composition analysis of archaeological artifacts and works of arts from the collections of the Museum of Fine Arts, Vienna, Austria. The investigated objects included ancient bronzes, coins, samples of pigments, and famous goldsmith work "Saliera" by Benvenuto Cellini (1500-1571). This presentation will also highlight other projects related to the applications of nuclear analytical techniques in support of study and preservation of cultural heritage objects supported by the International Atomic Energy Agency and carried out in the Agency's Member States.