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A multipurpose X-ray fluorescence scanner developed for in situ analysis

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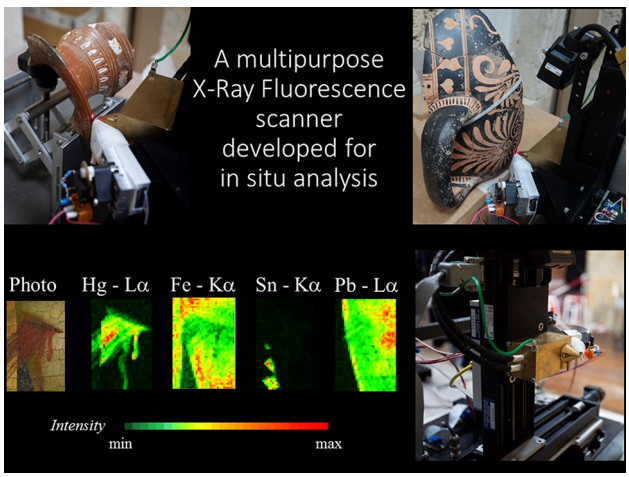
Abstract

Over the time, instrument transportability has become more and more important, especially in Cultural Heritage, as often artworks cannot be moved from their site, either because of the size or due to problems with permission issues, or simply because moving them to a laboratory is physically impossible, as e.g. in the case of mural paintings. For this reason, the INFN-CHNet, the network for Cultural Heritage studies of the Italian National Institute of Nuclear Physics (INFN), has developed an XRF scanner for in situ analyses. The instrument is the result of a wide collaboration, where different units of the network have been developing the diverse parts, then merged in a single system. The XRF scanner has been designed to be a *four-season* and *green* instrument. The control/acquisition/analysis software has been fully developed by our group, using only open-source software. Other strong points of the system are easiness of use, high portability, good performances and ultra-low radiation dispersion, which allows us to use even when the public can be present. It can run both with mains or on batteries, in the latter case with a maximum runtime longer than 10 h. It has a very low cost, when compared to commercial systems with equivalent performances, and easily replaceable components, which makes it accessible for a much wider portion of the interested community. The system has been thought and designed as an open system, suitable for further development/improvements, that can result interesting for non-conventional XRF analysis. The CHNet XRF scanner has proved to be really very well suited for applications in the Cultural Heritage field, as testified by the many recent applications. This paper describes the present version of our instrument and reports on the tests performed to characterise its main features.

Graphical abstract



Keywords XRF scanner · Acquisition · Transportable instrument · XRF imaging · Cultural heritage · In situ analysis

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