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A preliminary study of Cu-based alloys and artificial corrosion patinas by neutron imaging analysis

L. Vigorelli^{1,2,3}, A. Vietti^{1,3}, S. Grassini^{3,4}, L. Guidorzi², M. Magalini^{2,3}, A. Re^{2,3}, A. Lo Giudice^{2,3}, F. Grazi^{5,6}, N. Gelli⁶

1. *Dip. di Elettronica e Telecomunicazioni, Politecnico di Torino*
2. *Dip. di Fisica, Università degli Studi di Torino*
3. *INFN, Sezione di Torino*
4. *Dip. di Scienza Applicata e Tecnologia, Politecnico di Torino*
5. *Consiglio Nazionale delle Ricerche, Firenze*
6. *INFN, Sezione di Firenze*

When archeological copper-based artifacts are buried in soil for a long time, the result is a corrosion patina characterised by complex chemical and metallurgical structures [1]. The study of this finds requires several analytical techniques to characterise the material and the corrosion products [2]. Non-destructive studying methods represent an important tool for conservators to obtain valuable information about works of art in a non-invasive way. In the last decades, neutron imaging techniques have gained great importance in the Cultural Heritage field thanks to the results obtained [3]. In this study, several Cu-based alloys with composition like archaeological ones were prepared, some of them also artificially patinated. The samples were analysed with thermal neutrons at the L.E.N.A. Centre in Pavia, where a new facility for imaging studies has been recently developed in the framework of the CHNet-NICHE project and is currently under optimisation. The aim of the analysis is providing a reference for this specific beamline, estimating the attenuation coefficient values and its spatial distribution in the samples by means of digital radiography and to distinguishing between the alloy (inner part) and the patina (external part) with computed tomography. The goal is to determine the nature and properties of archaeological artefacts of unknown structure using the data obtained by analysing the Cu-based reference alloys.

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