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Combining XRF and GRT for the analysis of ancient silver coins

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**Combining XRF and GRT for the analysis of ancient silver coins**

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**Abstract**

Archaeological silver-copper alloys are usually affected by silver enrichment of the near surface layers, either intentional or fortuitous. In previous studies we have shown that surface composition of archaeological bronzes and leaded copper coins obtained by XRF can be corrected by means of gamma-ray transmission (GRT) to obtain the bulk composition. In the present work, we have studied the applicability of this method to silver-copper alloys and established the most suitable conditions for the GRT correction calculation. The analysis of the microstructure of the core and the corrosion layers of a set of silver roman coins shows that copper could be leached from the surface during corrosion and cleaning treatments, resulting in an apparent silver surface enrichment. After the correction calculations by GRT method, the concentrations of the major elements, Ag and Cu, were found to be in good agreement with the bulk composition obtained by direct analysis of the cut cross-sections of the coins. The GRT method shows to be a useful tool to study metal artefacts having a surface composition modified by corrosion or cleaning treatments.

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