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Silver surface enrichment of silver-copper alloys: a limitation for the analysis of ancient silver coins by surface techniques

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Abstract

The surface enrichment of archaeological silver-copper alloys has been recognized for many years. However, the origin of this enrichment is not well defined and many hypotheses have been put forward to account for this behaviour: segregation of the components during casting, deliberate thermal and/or chemical post-treatment, abrasion or corrosion. Among the hypotheses mentioned above, we have focused our study on the first step of coin manufacturing. Replications of silver-copper standards of various compositions ranging from 30% to 80% Ag, reflecting the composition of silver blanks, have been produced. Metallographic examination, PIXE and SEM-EDS have been used for the characterization of each sample. A model of the direct enrichment has been established. This model allows us to propose a relationship between the surface composition and the silver content of the core. Comparison with data of Roman coins

composition and the silver content of the core. Comparison with data of Roman coins from the Roman site of Châteaubleau (France) and from the literature and consequences for the analyses of ancient coins by surface methods are presented.



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Keywords

X-ray spectrometry; PIXE; SEM-EDS; Silver-copper alloys; Debased silver; Silver enrichment; Roman silver coins; Châteaubleau

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