

NUCLEAR SEMINAR SERIES

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Monday, February 4
4:00 pm - Rm 184 NSH

Multi-scale Characterization of the Roman Denarii

Scientific characterization of metal artifacts, such as coins, provides archaeologists and historians necessary information to better understand their preparation technology, patterns of distribution over time and also helps efforts to preserve and restore them. One of the most significant metal artifacts of the ancient world is the Roman denarius. It helped finance the expansion of the republic and the challenges of the civil wars of the first century BC. The denarius used as standard coinage during the first 250 years of the imperial period.

In this talk, I will present results of characterization for a set of denarii from different periods between 136 BC and 240 AD using large-scale X-ray fluorescence mapping (XRF), particle-induced X-ray radiation (PIXE), scanning electron microscopy with focused ion beam (FIB-SEM), transmission electron microscopy (TEM) and high-resolution electron dispersion spectroscopy (EDS). The combination of XRF and PIXE with different proton beam energies allowed us to visualize the surface distribution of individual elements. These results helped to select suitable areas for FIB-SEM-EDS analysis. In addition to this, the edges of the chosen coins were polished to remove a layer from 1 to 3 mm thick to display the center of the coins using the electron backscattering (BSE) method and EDS mapping. The microprobes extracted from the coins revealed the composition and structure of the silver-copper alloys used for the manufacture of coins. These methods enabled to investigate the surface, the subsurface and volume composition of these coins, to understand the main aspects of their production, surface treatment methods, and also revealed their corrosion patterns.



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