Visualizing Artist's Techniques through Macro-XRF Scanning of Painted Works

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Macro-XRF scanning has found tremendous use in the study of cultural heritage materials, most notably through its ability to reveal, with elemental specificity, hidden paintings. While the discovery of previously unseen works by important artists such as Rembrandt and van Gogh are exciting, not every painting has a hidden painting underneath. But macro-XRF scanning can do much more than uncover hidden paintings: it can also reveal previously undetectable details about the materials and techniques employed by artists to create works of art.

This poster will present the results of studies from a number of paintings and painted illuminations (images in books) that showcase the ability of macro-XRF scanning to elucidate the working process of the artist. The capability of macro-XRF scanning to visualize the distribution of major elements across the painted image provides researchers with a clearer understanding of how any given pigment (or other material) may have been employed by the artist, providing insight into the order and method by which individual components may have been applied. Furthermore, the detection of minor and trace elements can help characterize materials derived from different sources, providing information about important diagnostics such as date, location, trade networks, and studio practice.

For example, the application of gold leaf is ubiquitous in late medieval painting, but our knowledge of how it was applied is largely based on historical treatises and modern practice. Analytical techniques traditionally applied to the study of paintings – such as X-radiography and spot XRF – could identify only the presence and composition of the metal leaf. Macro-XRF scanning has opened up a new avenue of research by providing unprecedented new insight into how these micro-thin sheets of gold were manipulated and applied. In addition to elucidating the original artistic creative process, these scans have also helped identify subsequent interventions, providing new evidence of possible historic conservation or restoration efforts.