

# Optics & ART

## Revealing the hidden truth

This month's cover story (p. 28) looks at how terahertz imaging is being used to analyze works of art. Other noninvasive optical scanning methods are also being used to reveal hidden layers in artworks, and to help confirm creation dates and authenticity without risk of damage. Here are a few recent examples leveraging optical coherence tomography (OCT) and macro X-ray fluorescence (MA-XRF).



1. Researchers at the Belgian Royal Institute for Cultural Heritage looked at a still life originally attributed to Francisco de Zurbarán (1598–1664) that appeared to have more modern pigments.

2. An XRF analysis of the still life confirmed the presence of pigments from ~1921, suggesting that the painting was a modern copy, but did not rule out a hyper-restoration.

3. Re-investigation of the painting with MA-XRF confirmed the presence of an older painting below the surface and proved without any doubt that the still life was created after 1921, re-using an old canvas.

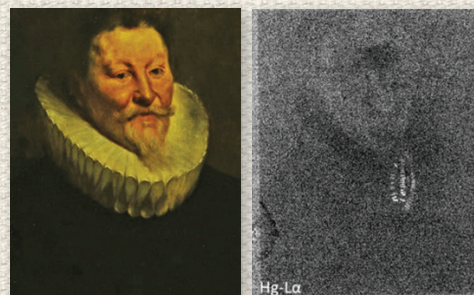
### Authenticating artwork



Researchers at Pusan University employed a combination of OCT and topographic analysis to compare *Self-portrait* by Jean-Ey Lee, 2014 (left), with a forgery created using similar materials (right), including canvas, paints and varnish. Using the measurement data, testers were able to distinguish the forgery from the original with 100% accuracy.



MA-XRF analysis of a 16<sup>th</sup>-century manuscript from Lviv, Ukraine, by researchers at Nicolaus Copernicus University in Toruń, Poland, revealed the use of different paints, suggesting the manuscript was created by more than one craftsman, each using their own set of materials.



Using MA-XRF, researchers at the Belgian Royal Institute for Cultural Heritage revealed a hidden manufacturing stamp (right) in a portrait of Jan Brant attributed to the workshop of Rubens (1577–1640), confirming the earliest possible creation date for the painting to be 1844, a few centuries later than originally supposed.