

# LMNT I & II Laser Elemental Analysis

The increasing demand for minimal intervention in combination with restrictions in sampling and transportation of cultural heritage and archaeological objects has led to the development of a transportable (LMNTI) and a fully portable (LMNTII) instrument for their analysis and characterization, based on Laser Induced Breakdown Spectroscopy (LIBS).

## Features:

- ✓ Qualitative multi-element analysis
- ✓ Semi-quantitative analysis
  - ✓ Results in seconds
- ✓ Micro analysis (~100 µm)
  - ✓ Accurate aiming
- ✓ User Friendly software
- ✓ No sample preparation
- ✓ No sample removal

## Applications:

- ✓ Rapid multi-elemental analysis
- ✓ “In-situ” surface analysis
  - ✓ Archaeometry
  - ✓ Art conservation



**LMNT I (el-em-ent-one)** is a compact laser analytical instrument, based on LIBS.

*The development of the instrument was supported, in part, by the Institute of Aegean Prehistory (INSTAP), USA*



**LMNT II** is a fully-portable version that enables analysis of objects at their location (museum, conservation lab, excavation site).

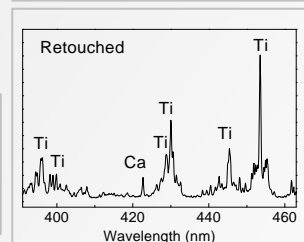
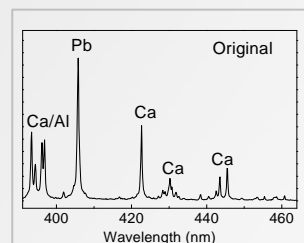
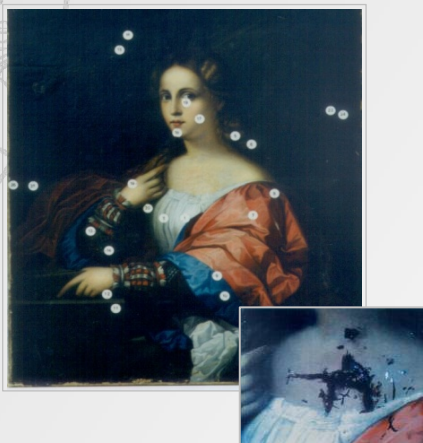
*The development of the instrument was funded, in part, through the EC (project PROMET, INCO-CT-2004-509126) and the General Secretariat for Research and Technology, Greece (project LASTOR, Π 14 / 2003).*

# LIBS analysis in Art and Archaeology

## Identifying pigments

LIBS analysis enables discrimination between original and retouched areas of the painting, based on the different pigments identified (original: lead white; retouched: titanium white).

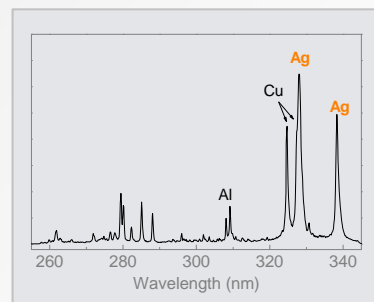
These findings suggest that the restoration was performed in the 20th century as titanium white became commercially available only after 1920.



## Analyzing archaeological metals

A rivet from the island of Pseira, Crete, used to hold the blade within the wooden handle of a Minoan dagger was analyzed by LIBS.

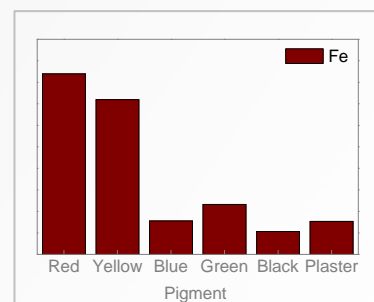
On the flat site of the rivet, silver was detected, suggesting that silver coating technology was available at this location since 16 century BC.



## Analyzing wall plaster pigments

Wall painting samples spanning two millennia of Cretan painting history and technology analyzed using LMNT II.

Iron signal is increased in red and yellow paints implying the presence of Iron oxides.



## Technical Data

**Laser:** nanosecond Nd-YAG 1064 nm

**Spectrometer:** range 250-650nm, resolution 0.5nm

**Dimensions:** Head: 20x10x3 cm -Control Unit: 26x25x9 cm -Spectrometer: 17x17x9 cm

**Weight:** Less than 10 kg

**Viewing / aiming camera**

**Build in spectral database for elemental identification**

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