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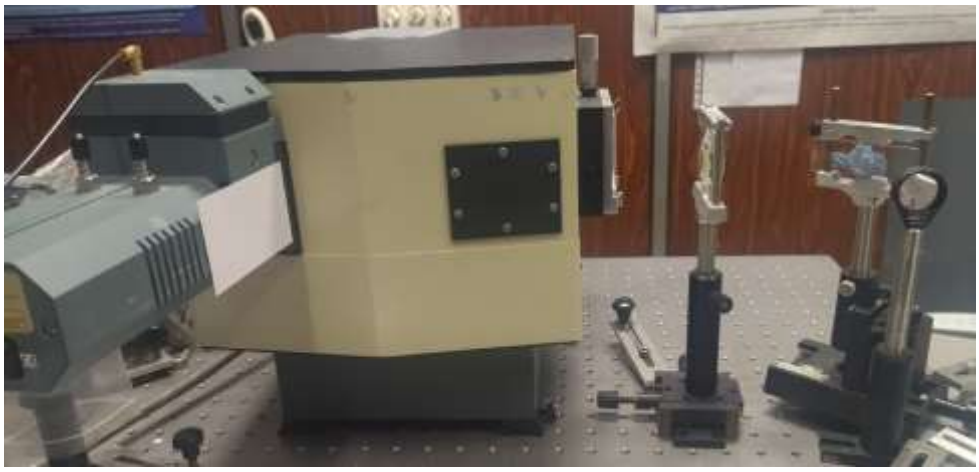
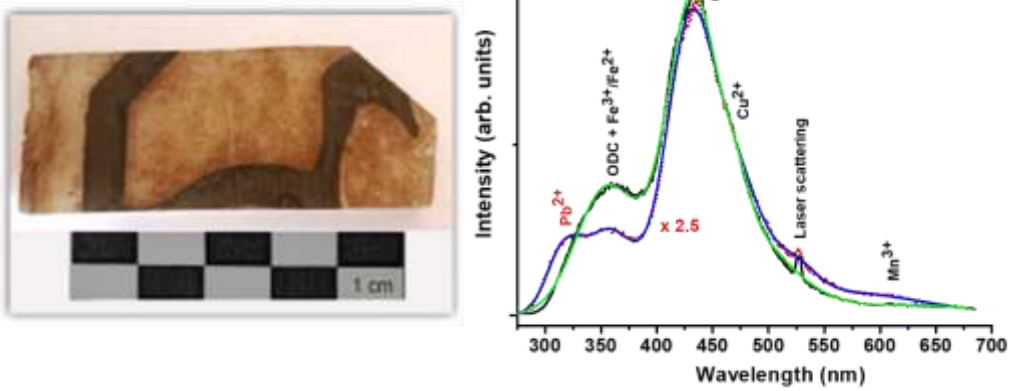
FIXLAB

LLHS, IQFR-CSIC. Laser Induced Fluorescence (LIF)

Description





Talanta 230 (2021) 122314.

Laser-induced fluorescence (LIF) is a totally non-invasive spectroscopic method in which an atom or a molecule of a given material is excited to a higher energy level by the absorption of a laser light pulse followed by spontaneous emission of light. The spectral analysis of the emitted light informs about the molecular nature of the excited material.

Fields of application

Cultural Heritage
Archaeological object and site, architecture, art, decorative arts, film, mosaics, painting, sculpture, textile

Natural Heritage
Fossil, mineral, shell, skeleton

Materials

Inorganic
Ceramic (clay/mud brick/terracotta/earthenware/stoneware/porcelain), glass, stone, metal and metallurgical by-products, pigment

Organic
Binding media, glues, wood, paper, textiles, varnishes

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Equipment

The LIF system is based on laser excitation with a Q-Switched Nd:YAG laser (LS-2147, Lotis II) operating at 266 and 355 nm, at a repetition rate of 10 Hz and delivering pulses of 17 ns with Gaussian-like spatial profile. The linearly polarized laser beam is directed to the surface of the sample by means of dichroic mirrors at an incidence angle of 45°. The laser spot size and pulse energy are adjusted to their lowest possible values, to achieve the maximum superficial resolution, to avoid sample damage and to obtain LIF spectra with a high signal-to-noise ratio. LIF spectra are acquired using a 0.30 m spectrograph with a 300 grooves/mm grating (TMc300 Bentham) coupled to an intensified charged coupled detector (ICCD, 2151 Andor Technologies).

Potential Results

Characterization of the molecular composition of different types of materials and assessment of modifications induced by degradation or during cleaning processes.

References

- https://lanamap.iqfr.csic.es/research/researchlines/135-lasers-in-the-conservation-of-cultural-heritage
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- Multiphoton Excitation Fluorescence Microscopy and Spectroscopic Multianalytical Approach for Characterization of Historical Glass Grisailles. Oujja M., Agua F., Sanz M., Morales-Martin D., García-Heras M., Villegas M.A., Castillejo M. *Talanta* 230 (2021) 122314.
- Detecting molecular changes in UV laser-ablated oil/diterpenoid resin coatings using micro-Raman spectroscopy and Laser Induced Fluorescence. Ciofini D., Oujja M., Cañamares M.V., Siano S., Castillejo M. *Microchem. J.* 141 (2018) 12-24.
- Analysis of heritage stones and model wall paintings by pulsed laser excitation of Raman, laser-induced fluorescence and laser-induced breakdown spectroscopy signals with a hybrid system. Martínez-Hernández A., Oujja M., Sanz M., Carrasco E., Detalle V., Castillejo M. *J. Cult. Herit.* 32 (2018) 1-8.
- Laser induced fluorescence and FT-Raman spectroscopy for characterizing patinas on stone substrates.Oujja M., Vázquez-Calvo C., Sanz M., Álvarez de Buergo M., Fort R., Castillejo M. *Anal.l Bioanal. Chem.* 402 (4) (2012) 1433-1441.

Sample or service requisites

- Samples with a size equal to or greater than 3 mm x 3 mm.

For further details please contact the provider.

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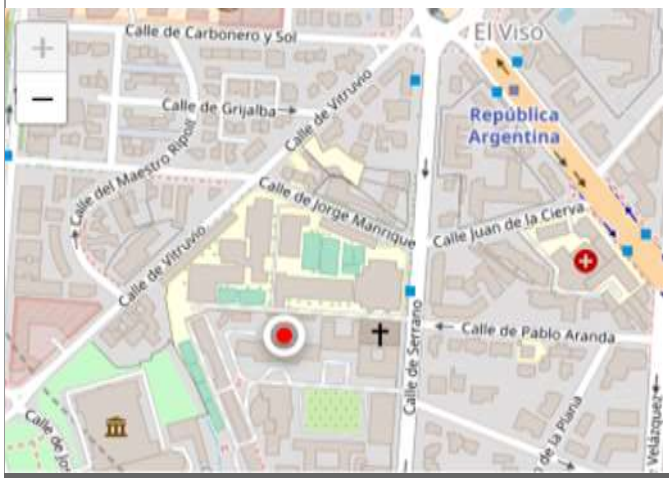
Provider



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