



University of Crete
Department of Physics

Physics Colloquium

Thursday, 17 October 2024 | 17:00 – 18:00, Seminar Room 3rd Floor

Exploring Archaeological Questions via Atomic and Molecular Spectroscopy

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ABSTRACT

Analytical spectroscopies have been proven capable to illuminate aspects of complex diagnostic problems encountered in the course of studies of archaeological findings, heritage objects and monuments by probing the compositional profile of materials from various perspectives. In this context, selected examples will be presented, which demonstrate how elemental or molecular spectroscopy and associated custom-made or standard instrumentation, contribute to the compositional analysis of archaeological samples or objects and to our understanding of their origin, use and or preservation.

Laser-Induced Breakdown [Plasma] Spectroscopy (LIB[P]S), implemented through an appropriately designed optical microscope, hence defined as micro-LIBS, has facilitated fast elemental mapping of marine shell cross-sections. The data produced, 2D elemental maps (Mg/Ca) of the aragonite growth layers reveal patterns which upon analysis are found to provide a reliable seasonally-resolved view of temperature fluctuations that can be related to environmental factors or used to trace activities of coastal communities.

Raman spectroscopy has been investigated with regard to its potential to assess the protein content of ancient teeth, which in turn can act as an indirect indicator for the degree of preservation of archaeogenetic material. The relative organic content in the cementum of the teeth, expressed as a spectral ratio of the amide-to-phosphate bands, (Am/P), was found to exhibit a weak to medium correlation with the amount of endogenous DNA (independently determined via ancient DNA analysis). This analysis facilitates satisfactory screening of samples with low content of endogenous DNA versus those with high content and appears to provide the means for a valuable assessment of the preservation of biogenic matter preservation in teeth and/or bones.