

Raman spectroscopy and associated techniques used in the pre-screening stage of radiocarbon dating process

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Employing instrumental analysis methods can provide precious information in establishing the processing strategy for initial samples, as well as verifying the final product purity which will be used in radiocarbon dating. RoAMS Carbon-14 dating Laboratory and Physical and Chemical Tests Laboratory (IRASM Radiation Processing Center) currently use, within the Center of Excellence for the Study and Conservation of Cultural Heritage, the following analytical methods: FTIR and FT-Raman spectroscopy, chromatography, mass spectrometry, thermal analysis, color analysis, ESR, TL OSL spectrometry. The present work highlights several case studies in which non-destructive and non-contact vibrational spectroscopy methods (FTIR and FT-Raman) offered additional information in establishing the age of museum materials under suspicion of being contaminated with preserving agents, but also for a series of archaeological materials for which the contamination is mostly due to environmental factors from the post-storage step.

Macromolecular structure characterization was performed by Fourier Transformed Infrared and Raman spectroscopy using a Bruker Vertex 70 FT-IR spectrometer equipped with a RAM II Raman module (N2 cooled detector). FT-IR was performed in transmission mode with KBr pellets and FT-Raman with a Nd:YAG laser excitation source of 1064 nm.

The present study focuses on using spectrometric techniques to study old osteological materials (raw bone powder and Type I collagen), hair and leather for the pretreatment step. All of these samples were dated at RoAMS in the final step.

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