

VIBRATIONAL SPECTROSCOPIES (IR AND RAMAN) FOR THE IDENTIFICATION OF PAINTING MATERIALS

Marta S. Maier

Department of Organic Chemistry, Faculty of Exact and Natural Sciences, University of Buenos Aires

Paintings are complex matrices constituted by layers of mixtures of inorganic and organic materials. Fourier Transform Infrared (FTIR) spectroscopy and Raman microscopy are vibrational techniques that can provide molecular information on painting materials, such as pigments and binders. Particularly, Attenuated Total Reflectance (ATR) FTIR spectroscopy is a non-destructive and fast method to obtain infrared spectra of inorganic and organic compounds without any previous preparation of the samples. At the same time, Raman microscopy has been extensively applied to the identification of pigments in cross-sections of micro-samples extracted from paintings.

The characterization of painting materials in artworks contributes to the knowledge of an artist's pictorial palette and technique, the preference and selection of certain pigments and their availability in a particular historic context. Information on painting materials is useful for authentication of artworks, their restoration, and the assessment of degradation processes of materials due to environmental factors and specific interactions between pigments and binders.

In this talk, a brief introduction on the fundamentals of both vibrational techniques will be presented, together with their advantages and limitations. The importance of a database of infrared spectra of reference painting and restoration materials will also be discussed. Then, several case studies will be presented, as for example the application to the analysis of pigments and natural binders in micro-samples from colonial polychrome sculptures and mural paintings, and the characterization of modern materials as synthetic organic pigments and polymers in contemporary artworks.

Intended audience: undergraduate and graduate students of chemistry, physics and related sciences.

Learning outcomes: understand the information that vibrational techniques provide and establish a criterion of their application regarding the question on the object.