

## LABORATORY: CNR SCITEC

### NAME OF THE INSTRUMENT

Fiber optic near-FTIR spectrometer JASCO NIR

### GENERAL DESCRIPTION:

NIR spectroscopy has become an increasingly useful analytical tool for non-invasive, contactless measurements by providing signals that are characteristic of infrared combination and overtone bands which have very low absorption coefficients. This technique is suitable for analysing organic and limited inorganic materials, by providing distinctive features regarding both chemical composition and physical properties (crystallinity, crystal shape and particle size). As the NIR radiation is particularly penetrating, it can typically pass through paint layers and reach the ground layer of paintings providing information of pigments and binders alike. Main drawbacks include however difficult band assignments which can be alleviated by the application of successive derivative transformations and multivariate data processing procedures.

### TECHNICAL DESCRIPTION:

The JASCO NIR spectrometer provides information across the spectral region of the near infrared ( $12500 - 4000 \text{ cm}^{-1}$ ). It consists of a halogen lamp as source, an InGaAs detector and a 2 m fiber optic sampling probe. The Y shaped silica-glass fiber optic probe contains of 14 fibers, 7 of which carry infrared radiation from the source to the sample, while the other 7 collect the radiation reflected off the surface. Spectral resolution is  $4 \text{ cm}^{-1}$  with a sampling area of about  $12 \text{ mm}^2$  and an artwork-probe working distance of about 6mm.

Figure a) FT-IR JASCO NIR operative conditions



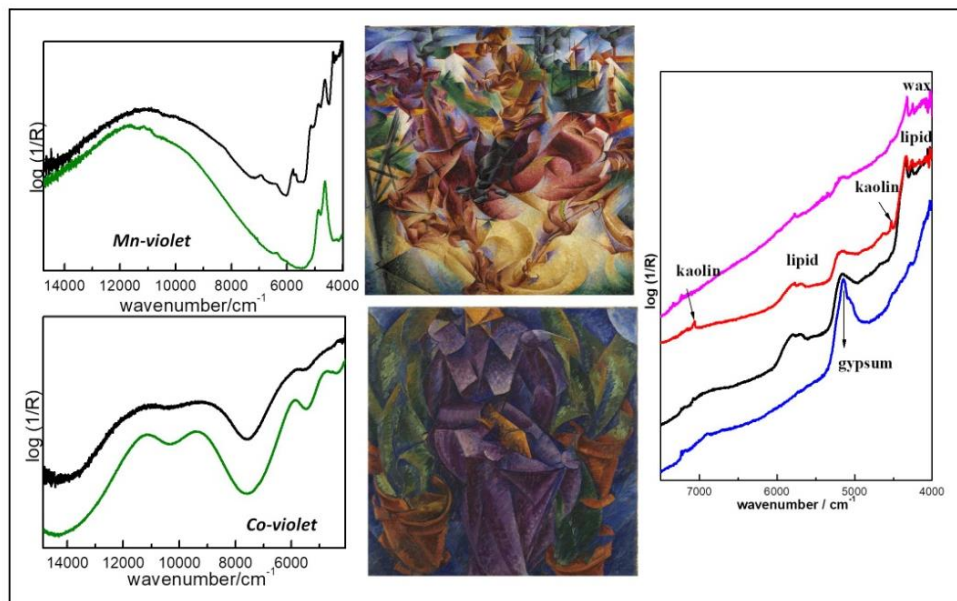


Figure b) analytical strengths of the method for the identification of organic and inorganic materials

**FURTHER INFORMATION:**

- Recent trends in the application of Fourier Transform Infrared (FT-IR) spectroscopy in Heritage Science: from micro- to non-invasive FT-IR, *Physical Sciences Reviews* 4(11), 20180006, eISSN 2365-659X, <https://doi.org/10.1515/9783110457537-006>
- Interpretation of mid and near-infrared reflection properties of synthetic polymer paints for the non-invasive assessment of binding media in twentieth-century pictorial artworks  
*Microchemical Journal* 124 (2016) 898–908

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