

## THE APPLICATION OF $\mu$ -RAMAN SPECTROSCOPY IN ANALYSIS OF ARCHAEOLOGICAL OBJECTS

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The  $\mu$ -Raman spectroscopy is an experimental technique that can be applied to the wide variety of archaeological and art objects, from pigments in different painted materials, fibres (natural and synthetic, dyed or raw), ceramics and glasses to gems.

Its application provides non-destructive, non-invasive, rapid, selective and sensitive analysis on very small or bulk samples, in laboratory or *in situ*. All this, together with the development of the new generation of Raman instruments, relatively simple to handle, positioned micro-Raman spectroscopy as one of the most important analytical and diagnostic tools for investigation of cultural heritage objects.

Applying this technique, different issues regarding characterization of the artifacts could be addressed

- Identification of the materials:

Natural and synthetic pigments in various kinds of supports (frescos, icons, manuscripts), natural organic binding media (waxes, resins, casein, oils, gums), natural plant fibres and gems could be identified based on the comparison with the database of reference spectra.

- Determination of the class, manufacturing technology and firing temperature in glazed ceramics and glasses. Raman spectroscopy makes it possible to calculate the index of polymerization ( $I_p$ ) of the glazes and glasses which is correlated with firing temperature of the object.

- Study of the surface modification (aging, corrosion, alterations).

Simple and fast approach in identifying products that has been developed by the external factors influence. Referent sample study, mimicing aging proceses allow to astimate the original colour (surfice) of the object.