

## *Curriculum*

Vittoria Guglielmi obtained her Master's degree in Chemistry at Università degli Studi di Milano and her Ph.D. in Chemical Sciences at the same University (2002) with a thesis entitled "Analytical and spectroanalytical techniques in the investigation of artistic and archaeological heritage". Since 2002 she is a researcher of the Faculty of Sciences of the University of Milano. The research activity of Vittoria Guglielmi has been mainly devoted to the development and application of analytical instrumental techniques, mainly spectroscopic and chromatographic techniques, for the investigation of both inorganic and organic materials in the field of the cultural heritage.

The main research lines are:

- identification of pigments in different works of art, such as illuminated manuscripts, frescoes and painted pottery, mainly by micro-FTIR and micro-Raman spectroscopies;
- study of the provenance and firing technology of archaeological pottery, especially in collaboration with the archaeologists responsible of the excavations in the archaeological site of Tarquinia, by ICP-OES, FTIR, NIR and XRD techniques;
- identification of organic archaeological residues, mainly resins, pitches and food remains exploiting GC-MS, FTIR and <sup>13</sup>C-NMR methods.
- identification of natural organic dyes of archaeological interest, using HPLC, spectrofluorimetry, and surface-enhanced Raman spectroscopy (SERS).
- analysis on other materials in the field of artistic and archaeological goods, like metallurgical slags, inks, leathers and degradation products.

The different characteristics of the materials investigated have required the use and development of distinct analytical techniques, as detailed below.

For the identification of artistic pigments and natural dyes, the main requirement of the techniques used was that of the micro-destructiveness and, at a later stage, the complete non-destructiveness and portability of the instrumental methods of analysis. Vibrational micro-spectroscopies were therefore privileged, especially Raman spectroscopy, whose excellent results in laboratory led to the development of portable instrumentation which allows the analysis of the works in the storage place or in any case without the need of taking any sample.

For the analysis of ancient pottery, atomic spectroscopies (ICP-OES and AAS) have been used for the determination of the elemental composition while FTIR and NIR spectroscopies and X-ray diffraction were used for the determination of the mineralogical composition. The elaboration of analytical data by means of multivariate analysis (PCA and cluster analysis) allowed to obtain finally information about the provenance and firing technology of the findings under investigation.

For the identification of archaeological organic residues, the method principally used was gas chromatography coupled with mass spectrometry (GC-MS), but particular attention was given to the role of FT-IR and <sup>13</sup>C-NMR spectroscopies allowing to obtain significant preliminary information on the findings without a laborious pre-treatment. In order to integrate the results obtained with the more traditional techniques already mentioned, some preliminary studies were also conducted on the applicability of the techniques GC / LP-FTIR (gas chromatography coupled to infrared spectroscopy using the "lightpipe" interface) and HPLC-MS.

The scientific activity of Vittoria Guglielmi has been reported in more than 40 papers and numerous communications in conferences.

## **Publications**

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