

## Contribution of Mid-IR Fiber-Optic Reflectance Spectroscopy to the Nondestructive Characterization of Artistic Prints

### ABSTRACT

The development of nondestructive analytical methodologies is an important goal in the field of cultural heritage. This presentation compared the results obtained in the characterization of prints by using three different mid-infrared spectroscopic techniques: the noninvasive fiber-optic reflectance spectroscopy (FORS) and the two classical micro-transmission ( $\mu$ -T) and micro-attenuated total reflection ( $\mu$ -ATR) techniques. Due to the difficulties in the comparison between FORS spectra with those collected in the traditional modes ( $\mu$ -T and  $\mu$ -ATR), principal component analysis (PCA) was applied for this purpose.

For this study, several prints were prepared by applying a single layer of ink over a substrate of Arches paper.

The results obtained in the measurements of prints made with different inks of several trademarks using two different FORS systems (IFAC and UB) and  $\mu$ -T and  $\mu$ -ATR techniques were presented.

Preliminary results show that, in the score plots corresponding to the first two principal components, the different spectra were grouped according to the instrumental techniques used. In addition, when the sets of spectra acquired using FORS were processed separately, the points corresponding to the different spectra obtained from the same sample in the scores plot were grouped. This result led us to the conclusion that FORS makes it possible to obtain useful information about the composition of prints. Similar results were obtained using  $\mu$ -T, but, in this case, sampling was necessary;  $\mu$ -ATR, on the other hand, did not provide useful data because this technique was greatly affected by the heterogeneity and irregularity of the print surface.

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