

ILLUMINATIONS: SECRETS, ALCHEMY AND CONSERVATION IN THREE CASE STUDIES

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The huge experience of the Institute in non-destructive analysis and characterization of pigments, inks, colours and dyes allows to recognize the palettes used by miniaturists, sometimes distinguishing the *scriptoria* themselves, identify posterior treatments and additions and assess the proper methods and products to be used in conservation.

In present work, the way such information is achieved by means of non-destructive spectroscopic molecular (Micro-Raman) and elemental (XRF and α -PIXE) techniques is described in three case studies of medieval manuscripts.

The study of the miniatures of the *Pontificale 492* (13th century, Museo Diocesano, Salerno, Italy) was specifically aimed at classifying the applied pigments and map them into the palettes used by each of the three illuminators working on the manuscript. In particular, the preparation of golden illuminations appeared dissimilar and we could find the use of Armenian bole, gypsum and white lead, alone or in mixture. The experimental results also allowed to prepare laboratory reproductions of the original illuminations, that were artificially aged and deteriorated in order to test different adhesives on them and to choose the best and less invasive preservation treatment.

The main object of the analyses carried out on the *Bibbia Amiatina* (7th-8th century, Biblioteca Medicea Laurenziana, Firenze, Italy) was to establish the original arrangement of the illuminations in the first booklet. To such an extent, the pigments that left impressions (offsets) on adjacent sheets and the offsets themselves were analyzed employing the already mentioned methods. In this way, it was possible to postulate an order for the sheets of the first booklet, even though it must be remarked that this order could not truly represent the original one, but simply the configuration assumed for most of the document's lifetime. The proposed order was accepted by the conservators who decided to re-assemble the Bible in this way.

Almost all pigments of the rich palette applied in the *Ms Piana 3.207* (13th century, Biblioteca Malatestiana Cesena, Italy) and the preparative layers were identified. The pigments' texture denoted a high skill in their preparation and application.

In this manuscript pure gold was used as well as mosaic gold. The last was applied to obtain particular hues and not to adulterate the gold. Isolation of mosaic gold (stannic sulfide) is actually an advance in the knowledge of illumination techniques, since this compound is not sold as a chemical product and no reports can be found in literature of standards prepared according to ancient recipes. It was therefore necessary to synthesize it in the laboratory, in order to have a standard for comparison.

Following the recipe described in *De Arte Illuminandi* we succeeded in preparing a pigment whose aspect and spectra optimally matched the original one.