

# Pigment analysis of Portuguese portrait miniatures of 17th and 18th centuries by Raman Microscopy and SEM-EDS

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Seventeen Portuguese miniature portraits on copper support from the Évora Museum collection (Portugal) were analyzed *in situ* and nondestructively by Raman microscopy (RM), SEM-EDS, and stereomicroscopy. This work constitutes a great breakthrough in the study of miniature paintings from the 17<sup>th</sup> and 18<sup>th</sup> centuries, since the chemical information known about this unique kind of paintings are still scarce, and in particular, this exclusive collection was never been subjected to any physicochemical study. In this work, each portrait was examined in detail in order to characterize the pigments palette used by the miniaturists. The  $\mu$ -Raman analysis, in particular, guaranteed an exceptional visualization and good individual identification of small grains of pigments and other constituents of the pictorial layer. Using this technique, 19 compounds were identified, including bluish black covellite, a pigment rarely found in oil paintings. SEM-EDS was used as an important complementary technique to confirm the chemical nature of some pigments and to identify shell gold (gold dust) in some portraits. Overall, the pigments identified in this large set of old paintings are broadly consistent with those mentioned in the painting treatises of that time or reported in other more modern bibliographic sources. Copyright © 2014 John Wiley & Sons, Ltd.

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