

## NON-INVASIVE XRF AND UV-VIS-NIR REFLECTANCE SPECTROSCOPIC ANALYSIS OF MATERIALS USED BY BEATO ANGELICO IN THE MANUSCRIPT GRADUALE N. 558

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Guido di Pietro, better known as Beato Angelico or Fra Giovanni da Fiesole (c. 1400-1455), was one of the most important artists of the 15<sup>th</sup> century. He excelled in wall- and panel-paintings as well as manuscripts and illuminates. His talent was celebrated two years ago at the San Marco Museum in Florence with a special exhibition “Fra Giovanni Angelico. Pittore miniatore o miniatore pittore?” in which the technique and materials used by the artist in making manuscripts and panel paintings were investigated and compared between these two different forms of art. The focus of the study in the context of the exhibition was on the materials - pigments and dyes - used by Angelico to produce manuscripts and, in particular, one of his most beautiful pieces of the permanent collection of the San Marco Museum: the *Graduale n. 558*.

Due to the fragility of parchment-based artworks, the application of *in situ* non-invasive analytical techniques is strongly recommended for analysing the materials used by artists in making the manuscripts. Moreover, non-invasive analytical methodologies are usually considered to be the most suitable techniques applied to the investigation of manuscripts since taking samples, or even micro-samples, from such delicate art objects is generally considered unacceptable. Indeed, the manuscript paint layers are typically very thin compared to those of wall and panel paintings, while painted decorations usually also cover relatively small areas.

The present communication illustrates the use of X-ray fluorescence (XRF) and ultraviolet, visible, and near infrared fibre optic reflectance spectroscopy (UV-Vis-NIR FORS), among the available *in situ* non-invasive techniques, in the characterisation of the materials used in making the *Graduale n. 558* by Beato Angelico. Some of the limitations and advantages of such methodologies, when applied to the study of this kind of art, are also discussed for illustrating the present state of the application of such techniques in the field of art.