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## Non-invasive study of natural dyes on historical textiles from the collection of Michelangelo Guggenheim

<sup>a</sup>L. de Ferri\*, <sup>b</sup>R. Tripodi\*, <sup>a</sup>A. Martignon, <sup>a</sup>E.S. Ferrari\*\*, <sup>a</sup>A. C. Lagrutta-Diaz\*\*, <sup>a</sup>D. Vallotto, <sup>a</sup>G. Pojana

<sup>a</sup>Department of Philosophy and Cultural Heritage, University Ca' Foscari of Venice, Dorsoduro 3484/d, I-30123, Venice, Italy

<sup>b</sup>Department of Management, University Ca' Foscari of Venice, San Giobbe, Cannaregio 873 Venice, I-30121, Italy

\* These authors contributed equally to the research

\*\* These authors contributed equally to the research

Corresponding author: Giulio Pojana- [jp@unive.it](mailto:jp@unive.it)

### Abstract

A selection of historical textile fragments from the Venetian art dealer Moisè Michelangelo Guggenheim collection, ranging from XV to XVIII century, has been investigated by means of non-invasive techniques in order to reveal the coloring materials. Imaging was preliminarily used to visually investigate the selected artwork fragments in order to investigate their structure and conservation conditions; Fiber Optics Reflectance Spectroscopy (FORS) allowed recognizing the main natural dyestuffs, such as indigotin and antraquinones-based compounds, except the yellow ones, difficultly identifiable when using this non invasive technique. Collected spectroscopic data have been also elaborated by using a clustering algorithm that permitted to group collected spectra on the basis of similar properties and evidencing their inflexion point wavelength as the most influencing feature.

### Highlights

- The antique dealer M. M. Guggenheim assembled a wide textile collection.
- A selection of fabric fragments ranging from XV to XVIII century was studied.
- FORS analysis allowed identifying dyestuffs such as indigotin and antraquinones.
- Flavonoids were found in yellow areas but no further classification was possible.
- Clustering analysis allowed grouping FORS spectra according to their spectral similarities.

**Keywords:** silk, historical fabrics, natural dyes, Reflectance Spectroscopy, clustering.

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