New Proposed Solution for the Safeguard of Artworks

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Abstract In the field of Cultural Heritage, the safeguard of artworks contends new and complex problems linked not only to conservative condition, maintenance, etc. but also to the introduction of fakes and problems linked to this aspects. In last years, dating and authentication studies, mainly based on historical-artistic-stylistic studies, have been supported by scientific world both through identification of materials and artistic techniques and proposing new anti-counterfeiting marks. Unfortunately, these solutions do not always solve doubts about counterfeits and the fight against fakes continues developing further research aimed to discover and to prevent the introduction of forgery. The current study shows a new possible solution in order to safeguard the artworks, creating an artwork's identity card that can be useful to control replacement of artworks, especially for paintings and during Fine Arts transportation.

During the centuries, the great interest, which has always been aroused by Art commerce, has caused often an increase of the demand for art-works that changes according to fashions and times. For this reason, the introduction on the market of art-fakes or counterfeit works is unfortunately a common practice that has continued up nowadays.

Among the new form of sly Art-thefts, the replacement of original paintings with perfect copies is one of most difficult to recognize. Moreover, considering that a painting or a mobile artwork increases its value also in correlation to the number of art-exhibitions around the world [BG06], [Goo06], [LL06], in which it takes part, artworks' handling can stand up for the masterpieces' substitution, increasing the problems linked to fine art transportation.

In the last years, scientists have tried to propose new solutions for the safeguard of artworks (i.e., Elettra-Synchrotron light source mark) [BBD+12], but the impossibilities to mark always surface or to apply tags, barcodes, RFID systems, etc. suggests to look for other possible solutions. The study, developed in a recent Ph.D. research [Vol13b], could be considered among new possible solution proposed to prevent forgeries and unpleasant replacements: through a multi-analytical approach, it is possible to identify artworks' characteristics that are helpful to establish the uniqueness of a particular artwork. In addition to draw up a sort of "artwork's identity card", these characteristics are useful to support authentication and dating studies integrating historical-artistic-stylistic information, designed for false artworks' identification. The features that are collected in a particular database are searched among the morphology of

pictorial layer and the chemistry of pigments' composition identified by pigment analysis.
The current paper shows some results obtained by the suggested multi-analytical procedure tested on modern and contemporary artworks made by important and renowned artists (A. Modigliani, P. Picasso, S. Sargent, F. De Pisis, G. Boldini) and on minute samples taken from them [Vol13a].
For each artwork (artistic techniques, materials, etc.), it was selected analytical methods that will be less invasive and more appropriate according to studied artwork (Figure 1).

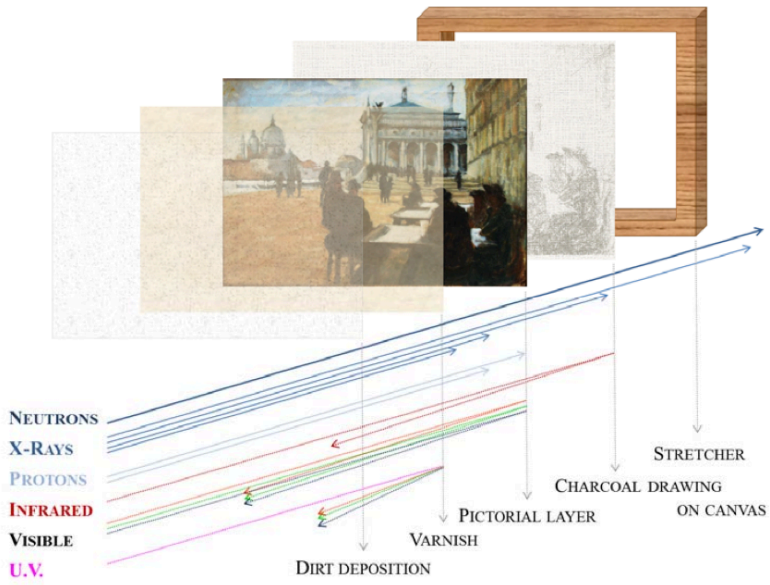

Figure 1. *Caffè Orientale sulla Riva degli Schiavoni* (J.S. Sargent, oil on canvas): schematic representation of the different penetration depth and layers probed by various analytical techniques that employ diverse radiation and particle source (reworked from Leonardi, 2005).

For some of the analysed painting, the results demonstrated to be also important to support authentication and dating studies. For instance, the study carried out on some white samples taken from artworks brought interesting results (Figure 2, 3), especially for the White titanium dioxide pigment, considered dating for ancient and modern artworks. The researches highlighted different morphology of pigment based on identified anatase or rutile phases [Vol13a]; according to the history of use of Titanium White Pigment, it was possible to suggest different post-quem achievement date according to the purity and morphology of pigment [EWCS08], [McC94], [Leo05], [Lew87], [Fit97].

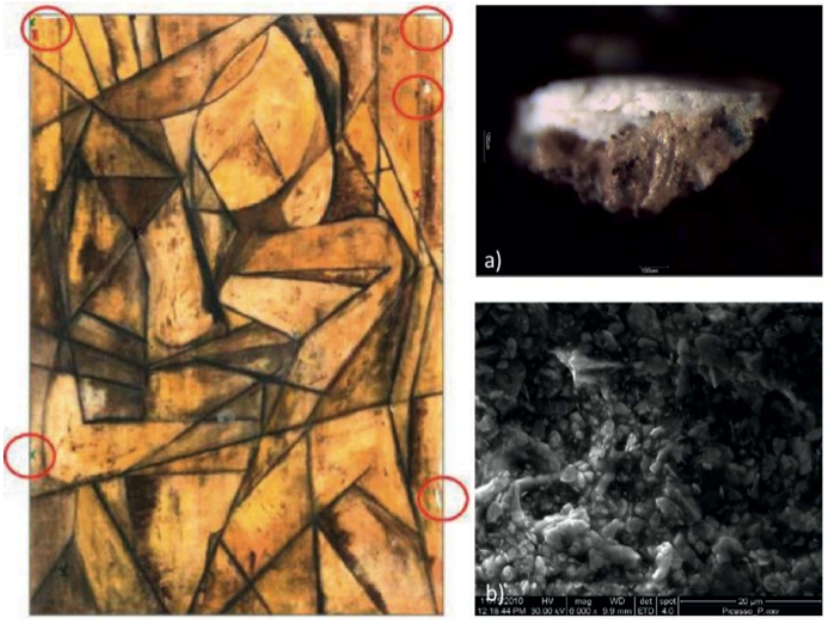

Figure 2. *Cubist Figure* (oil on canvas, 1909 - P. Picasso), sampling point: a) microphotograph of sample; b) SEM image of sample [Bruni 2012, Volpe 2013].

Figure 3. *Caffè Orientale sulla Riva degli Schiavoni* (oil on canvas, 1880/1882? - J.S. Sargent), sampling point: a) microphotograph of sample; b) SEM image of sample [Bruni 2012, Volpe 2013].

Several analytic techniques allow to identify pictorial characteristics of artistic technique through morphological studies of painting's surface (Figure 4b, 4d) and artistic palette through pigment analysis (Figure 4c, 4e), etc. [Vol13a].

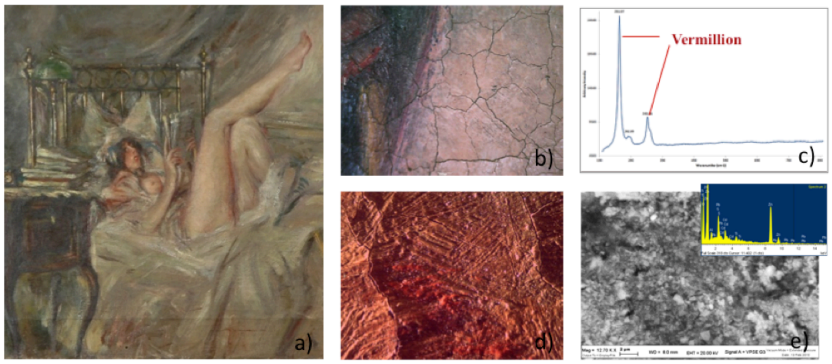

Figure 4. *Dama che legge ed anziano signore* by G. Boldini (oil on canvas, 1914? – private collection): a) detail of studied paitings; b) d) microphotographs of color painting and μ-craquelures captured by stereomicroscope (mag. 60x; normal light and grazing light); c) pigment analysis (Micro-Raman analysis); e) pigment analysis (SEM/EDS analysis) [Vol13].

Other artworks, instead, shows particularities in the pictorial layers highlighting the relationship between color and material (Figure 5), that is one of the most interesting aspects in the field of Cultural Heritage, fascinating both scientist for the creativity and technical knowledge of the past, which origin are in Alchemy, and historians, restorers to better understand artistic flair and for restoration interventions.

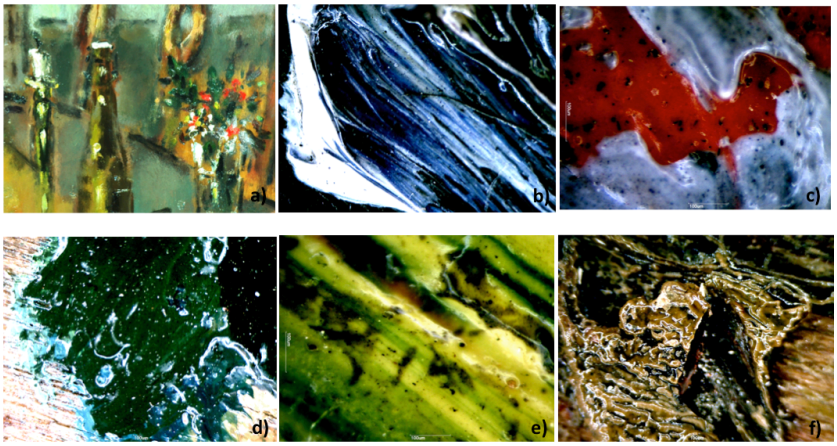

Figure 5. *Vase of Flowers* by F. De Pisis (oil on wood, date unknown – private collection): a) detail of studied paitings; b) c) d) e) microphotographs of color painting captured by stereomicroscope (different mag.; normal light and grazing light [Volpe 2013].

In conclusion, the proposed solution allowed to draw a card identity for the analysed painting, supporting also dating and authentication studies currently in progress.

Acknowledgements

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