To the Editor of the journal *ACTA IMEKO*

Dear Editor,

please find attached the manuscript entitled: “A combined 3D surveying, XRF and Raman *in situ* investigation on *The Conversion of St Paul* painting (Mdina, Malta) by Mattia Preti” by Sebastiano D’Amico, Emanuele Colica, Vincenza Crupi, Giuseppe Paladini, Sante Guido, Giuseppe Mantella, Domenico Majolino and myself, submitted for publication in the journal *ACTA IMEKO,* Special Issue relative to "2019 IMEKO TC-4 International Conference on Metrology for Archaeology and Cultural Heritage" (04-04 December 2019, Florence, Italy).

We declare that the manuscript is not under consideration for publication and has not been published elsewhere in any medium including electronic journals and computer databases of a public nature.

The submitted IMEKO paper is an **updated and extended version** with respect to the original Workshop paper:

- ***with modified title***, to distinguish the extended paper from the original Workshop paper;

- ***extended***(from 5 to 7 pages, more than 30% extension, as recommended), to remove size limitations the Conference required for its proceedings;

- ***updated***, to take into account progress since the Conference submission and discussions at the Conference.

For clarity, the original version of the Conference paper was also submitted as supplementary file (MetroArcheo2019\_Procs\_VENUTI.pdf).

The paper presents the results of three different approaches applied to the newly-restored titular painting *The Conversion of St Paul*, the main altarpiece in the Cathedral of Mdina in Malta. This large, dramatic painting is work of the Baroque artist Mattia Preti, *il Cavaliere Calabrese*. As is normal with a professionally executed restoration, several scientific methods have been used before, during and at completion, in the framework of a global analytical strategy. In particular, we focus on the results of the digital photogrammetric survey which uses image-based approaches for 2D/3D models reconstruction enormously. The model was used to quantify and measure important features on the painting as well extensions of areas restored. In addition, portable X-ray fluorescence (XRF) and Raman spectroscopies were used to non destructively identify, at elemental and molecular spatial scale respectively, the nature of the painting materials with the final goal of reconstructing the color palette of the artist.

**List of modifications and improvements of the original paper**

**Major points of extension**

- We improved the quality of the digital model presented during the conference. The final digital model has precision in the order of millimeters which allows to measure any part of the painting and to compare different portions if needed. In particular, we measure the main character of the painting as well as two particulars at the base of the painting. The old coat of arms was retrieved during restoration. Quantitative measurements were done to compare the two little portions of the painting.

- An analysis at elemental scale, by X-ray fluorescence spectroscopy, not present in the Conference paper, was now performed on seven selected points of the painting, representative of different pigmented areas, and the results are here reported. From the results, the key-elements responsible for the colorations were recognized and hypotheses regarding the nature of pigments were done.

- The analysis at molecular scale, performed by Raman spectroscopy and presented in a preliminary version (only for red and white pigmented areas) in the Conference paper, is now extended to other pigmented areas (i.e. blue, black, and incarnates). The molecular identification of all detected pigments is now supported by the XRF analysis at elemental level.

- The number of references to previously published work from other research groups within the same topic was now reasonably increased (from 16 in the Conference paper to 25 in the extended IMEKO paper).

The contents of this manuscript could appeal to the broad readership of the journal *ACTA IMEKO* because of the strong interdisciplinary nature of the argument.

We are looking forward to hearing from you.

Thank you for your consideration.

Yours sincerely,

Valentina Venuti (on behalf of all authors)

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