

Accepted Manuscript

In-situ imaging, elemental and molecular spectroscopy for the analysis of the construction and painting of a late period coffin at the Egyptian Museum of Cairo

Eman H. Zidan, Sara Mosca, Sara Bellei, Tommaso Frizzi, Michele Gironda, Ibrahim El-Rifai, Hend Mahgoub, Sabah Sadik, Mohamed Gamal Rashed, Iacopo Osticioli, Salvatore Siano, Gianluca Valentini, Abdelazek Elnaggar, Austin Nevin, Daniela Comelli

PII: S0263-2241(17)30764-9
DOI: <https://doi.org/10.1016/j.measurement.2017.11.055>
Reference: MEASUR 5124

To appear in: *Measurement*

Received Date: 1 March 2017
Revised Date: 3 November 2017
Accepted Date: 27 November 2017

Please cite this article as: E.H. Zidan, S. Mosca, S. Bellei, T. Frizzi, M. Gironda, I. El-Rifai, H. Mahgoub, S. Sadik, M. Gamal Rashed, I. Osticioli, S. Siano, G. Valentini, A. Elnaggar, A. Nevin, D. Comelli, In-situ imaging, elemental and molecular spectroscopy for the analysis of the construction and painting of a late period coffin at the Egyptian Museum of Cairo, *Measurement* (2017), doi: <https://doi.org/10.1016/j.measurement.2017.11.055>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



In-situ imaging, elemental and molecular spectroscopy for the analysis of the construction and painting of a late period coffin at the Egyptian Museum of Cairo

Eman H.Zidan^a, Sara Mosca^b, Sara Bellei^c, Tommaso Frizzi^d, Michele Gironda^d, Ibrahim El-Rifai^e, Hend Mahgoub^f, Sabah Sadik^a, Mohamed Gamal Rashed^a, Iacopo Osticioli^g, Salvatore Siano^g, Gianluca Valentini^b, Abdelazek Elnaggar^h, Austin Nevin^{c*}, Daniela Comelli^b

^a Egyptian Museum of Cairo, Ministry of Antiquities, Cairo, Egypt

^b Dipartimento di Fisica, Politecnico di Milano, Piazza Leonardo da Vinci 32, Milano, 20133 Italy

^c Istituto di Fotonica e Nanotecnologie, Consiglio Nazionale delle Ricerche, Piazza Leonardo da Vinci 32, Milano, 20133 Italy

^d XGLab SRL, Via Conte Rosso 23, 20134 Milano, Italy

^e Advanced Imaging Technology Laboratory, Graduate School of Engineering, Kyoto University, Japan.

^f Institute for Sustainable Heritage, University College London (UCL), London, UK

^g Istituto di Fisica Applicata "N. Carrara", Consiglio Nazionale delle Ricerche, Via Madonna del Piano 10, 50019 Sesto Fiorentino, Florence, Italy

^h Conservation Department, Faculty of Archaeology, Fayoum University, 63511, Al-Fayoum, Egypt

* Corresponding author: austin.nevin@ifn.cnr.it

Keywords: coffin, polychrome, late period, noninvasive methods, Multi-spectral imaging, X-ray fluorescence, Raman spectroscopy, Egyptian Blue, realgar

1. Introduction

Painting materials from ancient Egyptian artworks have received much interest; for their study various destructive and non-invasive measurement techniques have been applied¹⁻⁴. Contributions by conservators, conservation scientists and art historians have aimed at identifying pigments and binding media enriching the knowledge of ancient Egyptian color palettes⁵⁻¹⁰. One of the main concerns in Egyptian museums today is the conservation and preservation of the stored Egyptian archaeological heritage and the need for preventive conservation measures; it is noted that proper conservation requires knowledge of original materials and the careful analysis of artifacts. Often sampling is limited and non-invasive analytical techniques are preferred, but not widely available. The limited access to instrumentation and training are critical.

This work describes a measurement protocol focused on both working conditions and analytical procedures applied for the in-situ analysis of a Coffin stored in the Egyptian Museum Cairo using entirely transportable instrumentation, with a particular focus on the measurement conditions and practical considerations adopted during analysis. The study of cultural heritage is of wide interest to the scientific community, with dedicated publications focused on instrumental development and applications of non-invasive instrumentation to the analysis of easel paintings, but has not been extensive in developing countries without access to instrumentation and expertise.¹¹⁻¹² Due to its high sensitivity and applicability to a wide range of pigments, X-ray fluorescence (XRF) is one of the most commonly used portable non-invasive techniques, often combined with complementary molecular analysis, even if it is noted that stringent regulations in many countries are in place regarding health and safety for the operation of instrumentation in situ.^{14,15} In this work elemental data provided by XRF are complemented by molecular data provided by Raman spectroscopy which is considered an effective non-invasive approach for the identification of the palette of paintings, as long as fluorescence does not mask the weak Raman signal

Download English Version:

<https://daneshyari.com/en/article/7121957>

Download Persian Version:

<https://daneshyari.com/article/7121957>

[Daneshyari.com](https://daneshyari.com)