

TECHNART2015

Non-destructive and microanalytical techniques
in art and cultural heritage

CATANIA, APRIL 27-30, 2015
MONASTERO DEI BENEDETTINI

BOOK OF ABSTRACTS



WWW.TECHNART2015.LNS.INFN.IT

technart2015@lns.infn.it

Organized by

Partnered with

P1-155	The golds of Himera: a preliminary non-invasive archaeometric study of phiale aurea	Maria Francesca Alberghina, Maria Brai, Dorotea Fontana, Maria Rosa Panzica, Salvatore Schiavone, Luigi Tranchina and Agata Villa
P1-156	Spectroscopic analysis of decorated vestiges found in the Roman Theatre of Medellín, Badajoz, Spain.	Maria J. Nuevo, Alejandro Martin Sanchez, Miguel A. Ojeda and Santiago Guerra Millán
P1-157	X-Ray Fluorescence of Historical Written Manuscripts	Bernadette Frühmann and Manfred Schreiner
P1-158	Combined vibrational and chromatographic study of historical lakes and dyes	Francesca Gabrieli, Daniele Uldanck, Ilaria Bonaduce, Ezio Buzzegoli, Ilaria Degano, Diane Kunzelman, Costanza Miliani, Francesca Modugno and Francesca Rosi
P1-159	Combined X-Ray diffraction and fluorescence analysis in the cultural heritage field	Luca Lutterotti, Federica Dell'Amore, Diego E. Angelucci and Stefano Gialanella
P1-160	Provenance studies on early gold of bronze ages using lead isotope ratios (fs-LA-ICP-MCMS) and trace element fingerprints (ns-LA-ICP-QMS)	Robert Lehmann and Ingo Horn
P1-161	A new method for the automatic determination of shrinkage activity of historical collagen-based materials by thermal microscopy and image processing techniques	Elena Badea, Oana Andreea Miu and Cristina Carsote
P1-162	In situ EDXRF-Raman analyses for archaeological ceramic classification	Anna Galli, Letizia Bonizzoni, Roberto Alberti, Luca Bombelli, Tommaso Frizzi, Michele Girona and Marco Martini
P1-163	A physicochemical approach to the investigation of the condition of oil paintings on paper supports	Athina Alexopoulou, Brian Singer, Penelope Banou, Spyros Zervos, Agathi Kaminari, Anna Moutsatsou, Agni Terlixi, Eleni Tziamourani, Athanasios Karabotsos and Michalis Doulgeridis
P1-164	Multianalytical approach for studying a set of handmade paper documents manufactured in the 13th-15th centuries in Fabriano-Camerino area	Noemi Proietti, Donatella Capitani, Valeria Di Tullio, Claudio Pettinari, Graziella Roselli and Sandra Pucciarelli
P1-165	The use of several XRF modalities to investigation of paintings: the case study on the Late Gothic panel painting	Hana Bártová, Tomáš Trojek, Tomáš Čechák, Radka Šefců and Štěpánka Chlumská
P1-166	Study on degradation of Alizarin Carmine by vibrational spectroscopy	Lea Legan, Klara Retko and Polonca Ropret
P1-167	Amphibolite; tools, slabs and outcrops. A preliminary study of provenances using micro-X ray diffraction	Patricia Moita, José Mirão, Cátia Prazeres and Rui Boaventura
P1-168	Integrating optical imaging and digital processing for nondestructive diagnosis of artifacts	Elena Console, Anna Tonazzini, Emanuele Salerno, Pasquale Savino and Fabio Bruno

Integrating optical imaging and digital processing for nondestructive diagnosis of artifacts

E. Console⁽¹⁾, A. Tonazzini⁽²⁾, E. Salerno⁽²⁾, P. Savino⁽²⁾ and F. Bruno⁽³⁾

(1) TEA Sas di Elena Console & C., C.da S. Domenica 48e, 88100 Catanzaro, Italy

(2) National Research Council of Italy, ISTI, Via Moruzzi 1, 56124 Pisa, Italy

(3) University of Calabria, DIMEG, Via Bucci, cubo 46c, 87030 Arcavacata di Rende, Italy.

Optical imaging is one of the less expensive and less invasive techniques to capture information from tangible cultural heritage. An additional advantage is that it is faster than many other methods, providing comprehensive maps of the quantities under study in just one or a few steps. More specialized techniques, such as chemical analysis or spectroscopy, are capable of much more accurate and reliable measurements; on the one hand, however, these pointwise techniques often need a panoramic pre-diagnostics to find the areas of interest; on the other hand, diversity imaging complemented by appropriate processing techniques is often able to extract information that can well provide for the diagnostic needs at hand.

In this presentation 3D and multispectral imaging are treated, since 3D spatial and spectral data allow us to extract information on the conservation, the structure and the composition of the object studied. Moreover, details that are invisible to the naked eye can emerge without damaging the object. For example, IR light can penetrate the surfaces, thus revealing invisible details such as pentimentos, sinopias or underdrawings in paintings. Also, by IR light we can distinguish different materials, such as iron- and carbon-based inks in ancient documents, or reveal the presence of biological or non-biological contaminants. As another example, an UV-fluorescence image can discriminate between apparently similar pigments, thus helping the historical and critical study of the artifact. 3D imaging, finally, allows us to study an object through its digital model, thus determining its deformation, the presence of flaws or cracks, and other features. Many of the possibilities mentioned are now long established [1]. What is relatively new in cultural heritage conservation is the integrated use of all the available channels together, to extract information patterns that are not detectable in any of the channels if analyzed alone. To this end, we have been studying and employing a number of processing algorithms that are capable of transforming the "color" layers in the raw image to coherent "information" layers in the processed output, sometimes with the help of the associated 3D information [2]. These algorithms range from the necessary multiple spatial colocation, through simple color space manipulation, to sophisticated statistical procedures applied to both the spectral and the spatial features of the input image. We also built an integrated 3D-multispectral capture system [3]. In this presentation, we describe this system and the numerical procedures we have been using in several applications, and report the results obtained in some real case studies.

Work supported by European funds, through POR Calabria FESR 2007-2013 - PIA Regione Calabria, project ITACA (Innovative Tools for cultural heritage ArChiving and restorAtion).

[1] A. Pelagotti, A. Del Mastio, A. De Rosa, A. Piva, IEEE Signal Processing Magazine 25(4), 2008, 27.

[2] S. Legnaioli, G. Lorenzetti, G. H. Cavalcanti, et al., Heritage Science 1, 2013, 33.

[3] G. Bianco, F. Bruno, M. Muzzupappa, J. Cultural Heritage 14, 2013, 190.