

Preface

Characterization, diagnosis and conservation of Cultural Heritage

It is now an established concept within the scientific community that an interdisciplinary approach is fundamental in studying the wide and complex universe of materials of Cultural Heritage, whose characterization needs adequate strategies in view of preserving art and archaeological artifacts. In this context, the Italian Gruppo Nazionale di Mineralogia (GNM) and Georisorse, Ambiente e Beni Culturali (GABeC), under the aegis of Società Italiana di Mineralogia e Petrologia (SIMP), with the support of University of Catania, organized an International School on Innovative methodologies for the characterization, diagnosis and conservation of the Cultural Heritage, held in July 2014 in Catania and Siracusa (Sicily, Italy). Lectures were delivered by an international, interdisciplinary panel of experts; the school was attended by an international audience of 53 young researchers. More details about the school can be found in the website <https://sites.google.com/site/schoolgabec2014/>.

The main goal of the school was to develop knowledge regarding the complementary use of classical and innovative methods for the study of Cultural Heritage, especially focusing on diagnostic and conservation aspects, and considering the different skills and expertise of geologists, chemists, physicists, archaeologists and conservation scientists.

This special issue of the European Journal of Mineralogy aims to illustrate some of the topics discussed during the School, collecting a selection of valuable contributions presented during the School by lecturers and students.

The structural characterization of natural building stones is performed with innovative and non-invasive methods, with the aim of highlighting the need for several complementary techniques to better understand the mechanism of degradation, and to provide appropriate durability parameters. This approach supplies fundamental information in view of adopting adequate conservation and protection strategies. The papers by Dewanckele et al. and Raneri et al. focus on the use of X-ray micro-CT as a direct method for the study of stone porosity at the millimetre to micrometre scale. Similar information can be acquired by two- and three-dimensional neutron images, thanks to the deep penetration of neutrons in most materials, as shown by Teixeira et al. Neutrons also permit to obtain important data on texture at nanometre domains using Small Angle Neutron Scattering (SANS) analysis. Finally, high-resolution solid-state NMR also provides information on the porous and chemical structure of materials with non-destructive and non-invasive in situ investigation, as shown by Di Tullio et al.

Regarding the conservation and protection of Cultural Heritage materials, recent developments in the field of nanotechnology opened new perspectives in using non-toxic, highly efficient, economic, easily available and compatible products that, however, need an accurate mineralogical and microstructural analysis of the substrate, as exposed in Arizzi et al.'s paper.

Another issue related to archaeometry is represented by provenance questions, both for artifacts and raw materials, mainly involving objects made of ceramics, mortar, plaster and glass, for which the possibility to identify the used raw materials has a key role in interpreting trade routes in ancient cultures. Moreover, the possibility to investigate chemical, mineralogical and structural features of archaeological materials allows one to shed light on aspects such as production processes, obtaining a complete scenario on the technology used over the time. Examples of these topics are presented in the studies of Gradmann et al. on Islamic glazes, and of Conte et al. and Di Bella et al. on historic and prehistoric glasses.

Considering the success of the School, which was an excellent platform to shed light on new research advancements on Cultural Heritage, we hope to give readers of this issue an overview on recent developments in the study of Cultural Heritage materials by the international community.

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