



TECHNOHERITAGE

2019 **IV INTERNATIONAL CONGRESS**
SCIENCE AND TECHNOLOGY FOR THE CONSERVATION OF CULTURAL HERITAGE
SEVILLE MARCH 26-30, 2019

BOOK OF ABSTRACTS



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PREFACE

The influence of technological and scientific advances in the management of cultural heritage are taking place at an ever-increasing pace. In the last decades, systems of auscultation, prospecting, modeling, representation, data management, and material analysis have reached unprecedented relevance. Digital technologies enhance, quantitative and qualitatively, the possibilities to approach historical heritage; furthermore, they are opening new ways of interpreting and disseminating it.

New horizons are opened and, therefore, it is possible the incorporation of very diverse viewpoints on heritage issues from specialized disciplines, each of them with their own languages and algorithms. This multidisciplinary approach deepens the processes of heritage management, but also makes them more complex and hard to interpret as a whole. Furthermore, the problems of the management and preservation of increasingly specialized heritage information and documentation are being reported since a few years ago.

Technoheritage, the Network on Science and Technology for the Conservation of Cultural Heritage (1) started up in March, 2011, joining seventy seven research groups and institutions, which are organized in three activity areas: research groups of CSIC, Spanish National Research Council (Consejo Superior de Investigaciones Científicas in Spanish) and several Spanish universities; cultural institutions, foundations and museums; and sector companies. Technoheritage aims to support the cooperation between the agents of the science-technology-companies system in order to share ideas and experiences easily, helping to solve problems and allowing technology transfer, with the common objective of contributing to the conservation of Cultural Heritage.

Technoheritage activities are focused in: 1) the promotion of the different groups by means of activities coordination, currently dispersed in different scientific areas; 2) the achievement of the institutional recognition of the activities and promotion of the member groups through priority actions; 3) the promotion of collaboration between the groups in order to create a critical mass via their association in national and international research projects; and 4) the projection of Technoheritage by means of the cooperation with other similar European groups in order to ease the access to consortiums and international projects.

This International Congress of Science and Technology for the Conservation of Cultural Heritage is developed in the context of the Technoheritage network activity. In this 4th edition, it is also supported by IAPH, Andalusian Institute of Historic Heritage (Instituto Andaluz de Patrimonio Histórico in Spanish). This Congress is an international meeting for researchers and specialists in different areas that share the interest in knowledge and preservation of the Cultural Heritage, including sessions focused in architectural heritage, and in digital strategies and tools for decision-making.

Contributions about advanced technologies and materials will be presented, as well as edge topics of this field as heritage management, social impact, risks and vulnerability, highlighting the role and impact of digital technologies in knowledge, protection, conservation, management and dissemination of Cultural Heritage. Digital technologies will not be considered just as enhanced tools for traditional methodologies in Cultural Heritage, but also as a driving force for deep changes in those methodologies and in the way that heritage is understood and communicated, offering a new horizon of strategies for its sustainable conservation.

The Congress and its topics structure emerge from the actions programmed in two I+D+i projects funded by the current Ministry of Science, Innovation and Universities of Spain, both project teams have closely cooperated in its organization, counting on the active participation of IAPH team. One of these projects is Art-Risk (2), leaded by PhD Pilar Ortiz Calderón from University Pablo de Olavide, and the other project is TUSOSMOD (3), leaded by PhD Francisco Pinto Puerto from University of Seville. Both researchers are the directors of this Congress, coordinated by PhD Manuel Castellano Román.

(1) TechnoHeritage has been funded by the Ministry of Science, Innovation and Universities (Action HAR2010-11432-E), the State Research Agency (Ministry of Economy, Industry and Competitiveness; (Networks of Excellence 2016, HAR216-81748-REDT) and the own resources of the participating groups. More information in the web: <http://www.technoheritage.es/>

(2) Project BIA2015-64878-R of the Universidad Pablo de Olavide (UPO)
: www.upo.es/investiga/art-risk/

(3) Project HAR2016-78113-R of the Universidad de Sevilla (US):
www.grupo.us.es/tusosmodhum/

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Historical restorations of the Maqsura mosaics from the Mosque of Cordoba (Spain)

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Abstract:

Built in 786 AD, the Great Mosque of Cordoba was significantly expanded during the caliphate of Al-Hakam II (962-965 AD). It was during this campaign that the three doors of the Maqsura and the Mihrab ceiling were decorated with glass tesserae. Ancient texts claim that a master mosaicist and the original tesserae came from the Byzantine Empire as a present from the Emperor Nikephoros II Phokas. In 1236, King Ferdinand III of Castile conquered Cordoba and the bishop of Osma consecrated the Mosque as the Cathedral of the Assumption of the Virgin Mary. In 1368, an altarpiece triptych was placed in front of the Mihrab to hide it, while the mosaic on the Bab Bayt al-Mal chamber was covered with a canvas. The Sabat chamber has since been used as the archive of the Cathedral. The removal of the triptych in the 18th century, and canvas at the beginning of 20th century, revealed that the glass mosaics were severely damaged. The Cathedral thus ordered their comprehensive restoration. At least three different restoration campaigns are known from textual sources.

The main objective of this study was to identify the glass tesserae from the different historical restorations and to characterize them. The mosaics from the Mihrab, the Sabat chamber and ceiling mosaics presented different types of tesserae spread along the two doors and the ceiling that can be attributed to the different restorations. However, the mosaics from the Bab Bayt al-Mal chamber presented different glass compositions because it was completely removed and an exact replica was installed in 1916.

The chemical analysis detected a glass with high contents of PbO, mainly in the replacement tesserae. The tesserae were classified into five different groups: tesserae with gold leaf, with inclusions, with bubbles, homogeneous opaque tesserae and red opaque tesserae. The main chromophores were iron, manganese, cobalt and copper; and nanoparticles of Cu₂O and metallic copper in the red opaque tesserae. The most common opacifiers were calcium antimonate (Ca₂Sb₂O₇), feldspar (KAlSi₃O₈), bindheimite (Pb₂Sb₂O₇), hematite (Fe₂O₃), cassiterite (SnO₂), quartz (SiO₂), cristobalite (SiO₂), tridymite (SiO₂) and lead tin yellow type II (PbSn_{1-x}Si_xO₃).

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