TECHNART 2023
LISBOA

International conference on analytical techniques in art and cultural heritage
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BOOK OF ABSTRACTS

TECHNICAL INFORMATION

TECHNART2023 BOOK OF ABSTRACTS

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TECHNART2023
Non-destructive and Microanalytical Techniques in Art and Cultural Heritage. Book of Abstracts

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FOREWORD

The first **TECHNART** conference was held in Lisbon in 2007 by the initiative of the Atomic Physics Center from the University of Lisbon, current Laboratory for Instrumentation, Biomedical Engineering and Radiation Physics (LIBPhys). The conference aimed to provide a cultural heritage science forum where the use of analytical techniques in art and cultural heritage were presented and discussed.

After five editions held in different European cities and a hiatus of four years due to COVID, it is a privilege to welcome in 2023, once more in Lisbon, the **TECHNART** conference.

The conference topics covers the application of a large range of analytical methods to art and cultural heritage investigations, namely X-ray analysis, confocal X-ray microscopy, synchrotron, ion beam and neutron-based techniques, FT-IR and Raman spectroscopy and microscopy, UV-Vis and NIR absorption/reflectance and fluorescence, laser-based analytical methods, magnetic resonance techniques, chromatography and mass spectrometry, optical and coherent imaging techniques, remote sensing and hyperspectral imaging.

The **TECHNART2023** program is organized in thematic sessions on analytical methods and their application to art and cultural heritage. Eight invited speakers will open thematic sessions on analytical methodologies, textiles, pigments and dyes, varnishes and resins, and metals. For four days, **TECHNART2023** brings in over 180 oral communications in three parallel sessions and more than 260 posters distributed in four sessions. The abstracts from oral and poster communications are collected in this book.

The conference accounts circa 400 participants representing around 50 countries from all over the world, offering an outstanding opportunity for exchanging knowledge and establishing new networks with other cultural heritage science researchers.

TECHNART2023 results from the straight collaboration between LIBPhys and the other organizing institutions (NOVA School of Science and Technology, Faculdade de Ciências da Universidade de Lisboa, Universidade de Coimbra, Associação para o Desenvolvimento do Departamento de Física da Universidade de Coimbra) with the support from the TECHNART International Scientific Committee. It was equally important the partnership with Centro HERCULES, Museu Nacional do Azulejo, Microchemical Journal, and Journal of Cultural Heritage, as well as the participation of the commercial companies (HIROX Europe, OPUS instruments, NIREOS, BRUKER, FORENSCOPE) and the sponsoring of Heritage journal, Xpecam commercial company and the European X-ray Spectrometry Association (EXSA).

Marta Manso and Maria Luísa Carvalho, May 2023 (Chairs)

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The newest metal findings from the Early Eneolitic house

in South-eastern Serbia

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Velika Humska Čuka is a multi-layered archaeological site near Niš in South-eastern Serbia that was inhabited from the middle of the 5th millennium BC to the 5th century AD. During excavations in 2022, a set of 22 bronze objects was found in a shallow pit dug into the remains of an Early Eneolithic house.

This small hoard consists of 10 circular pendants with a central knob, ten pieces of spirally twisted bronze wire that formed tubes (so-called salteleons), a pin, and a long bronze band that has been folded several times. Pendants and saltaleons once formed a necklace which, together with a pin, were typical for the territory of today's central Europe at the end of the Middle Bronze age and during the Late Bronze age. This type of pendant appeared in the central Balkans at the beginning of the Late Bronze Age, together with other finds that originated from central Europe. Many archaeologists believe such bronze finds reached the central Balkans with the communities of the so-called Tumulus culture, which began to spread from Central Europe in the middle of the 2nd millennium BC. According to the distribution and dating of this type of pendant, the hoard from Velika Humska Čuka belongs to the Br C-D period (14th-13th century BC).

The XRF analysis was performed to reveal the elemental composition of the metal objects. The objects were cleaned before analysis, so only the metal parts were analyzed. The analysis was performed using a hand-held XRF spectrometer Hitachi X-MET8000 Optimum, operating in metallic mode. Additionally, the analysis was performed using an in-house developed pEDXRF spectrometer which consists of a side-window X-ray tube-Oxford Instruments (Rh anode, max. voltage 50 kV, max. current 1 mA, with forced air cooling) as an excitation source and a compact X-ray spectrometer (X-123, AMPTEK Inc. with Si-PIN detector 6 mm^2/500 μm, resolution 160 eV at Mn Kα line, 12.5 μm thick Be window and 1.5" extension). A pinhole collimator was used to focus and reduce the X-ray beam to an approximately 2 mm spot size on the object's surface, which can be precisely aligned to the excitation beam and visualized as the measured spot using two laser pointers. The quantification was done using brass standard reference material-Naval Brass C1108.

The analysis showed that copper, tin, nickel, and arsenic could be found in all analyzed samples, almost in the same quantity, indicating the same raw material origin.