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# NEM 2023
# ABSTRACT BOOK

3rd International Natural Science, Engineering and Material Technologies Conference

September 21-23, 2023, Turkish Republic of Northern Cyprus

# FOREWORD

It is a pleasure for us to offer you this Book of Abstract for the 3 rd International Natural Science, Engineering and Material Technologies Conference (NEM 2023). Our goal was to create a platform that introduces the newest results on internationally recognized experts to local students and colleagues and simultaneously displays relevant Turkish achievements to the world. The positive feedback of the community encouraged us to proceed and transform a single event into a conference series. Now, NEM 2023 is honored by the presence of over 110 colleagues from various countries. We stayed true to the original NEM 2023 concept and accepted contributions from all fields of materials science and technology to promote multidisciplinary discussions. The focal points of the conference emerged spontaneously from the submitted abstracts: energy applications, advanced materials, electronic and optoelectronic devices, organic electronic materials, chemistry, physics, environmental science, medical science, applied and engineering science, computer simulation of organic structures, biomedical applications and advanced characterization techniques of nanostructured materials. Further fields of interest include e.g. new advanced and functional materials, advanced-functional composites, biomaterials, smart materials, dielectric materials, optical materials, magnetic materials, organic semiconductors, inorganic semiconductors, electronic materials, graphene, and more.

Therefore, we hope that getting first-hand access to so many new results, establishing new connections and enjoying the Turkish Republic of Northern Cyprus ambience will make you feel that your resources were spent well in NEM 2023.

Our warmest thanks go to all invited speakers, authors, and contributors of NEM 2023 for accepting our invitation, visiting Turkish Republic of Northern Cyprus and using NEM 2023 as a medium for communicating your research results.

We hope that you will enjoy the conference and look forward to meeting you again in one of the forthcoming **NEM 2024** event.

Best regards,
Chairmen's of Conference

**Assoc. Prof. Burhan COŞKUN**

**Prof. Dr. Huriye İCİL**

**Editor:**

**Assoc. Prof. Burhan COŞKUN**

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| PROGRAMME<br>21 SEPTEMBER 2023 (THURSDAY)<br>HALL-1 | |
|---|---|
| **10:00-10:05** | Opening Ceremony |
| **10:05-12:00** | **1st session (Oral Talks) Chair: Assoc. Prof. Burhan COŞKUN** |
| **10:05-10:50** | **OPENING SPEAKERS**<br>**- Prof. Dr. Huriye İCİL / Conference President**<br>**- Prof. Dr. Aykut HOCANIN / Rector of Eastern Mediterranean University**<br>**- Olgun AMCAOĞLU / TRNC Minister of Economy and Energy**<br>**- Nazım ÇAVUŞOĞLU / TRNC Minister of National Education and Culture** |
| **10:50:11:15** | **Invited Talk-1:** Prof. Dr. Fahrettin YAKUPHANOĞLU: "NANOSTRUCTURE RADAR ABSORBING MATERIALS FOR PHANTOM AIRCRAFTS" |
| **11:15-11:40** | **Invited Talk-2:** Prof. Dr. Serap GÜNEŞ: "EFFECT OF BIOFILMS AND ADDITIVES ON THE PERFORMANCE AND STABILITY OF PEROVSKITE SOLAR CELLS" |
| **12:00-13:30** | **Lunch** |
| **13:30-15:30** | **2nd session (Oral Talks) Chair: Prof. Dr. Serap GÜNEŞ** |
| 13:30-14:00 | **Invited Talk-3:** Prof. Dr. Şemsettin ALTINDAL: "HIGH THERMAL SENSING CAPABILITY AT HIGH TEMPERATURES AND IMPEDANCE-VOLTAGE-TEMPERATURE (Z-V-T) CHARACTERISTICS IN Al/(S:DLC)/p-Si/Au STRUCTURES" |
| 14:00-14:15 | *S. TEMURLU, H. CANER, H. İCİL:* "A NEW MULTICHROMOPHORIC PERYLENE DYE: DONOR/ACCEPTOR SYSTEMS" |
| 14:15-14:30 | *E. DOĞRU, N. B. ÜLLEN, B. KIZILDUMAN, H. İCİL:* "COMPARISON OF CYPRUS LATE BRONZE AGE BOWL MANUFACTURING METHODS IN PERSPECTIVE OF ARCHEOMETRIC STUDI<br>ES" |
| 14:30-14:45 | *A. ABOURAJAB, S. KOYUNCU, H. İCİL:* "SYNTHESIS AND CHARACTERIZATION OF TWO NOVEL MONO BAY-SUBSTITUTED PERYLENE DIIMIDE DERIVATIVES" |
| 14:45-15:00 | *M. DİNLEYİCİ, H. İCİL:* "SYNTHESIS, PHOTOPHYSICAL, ELECTROCHEMICAL AND MORPHOLOGICAL PROPERTIES OF A NOVEL CHITOSAN-BASED FLUORESCENT POLYMER" |
| 15:00-15:15 | *S. SOYEL, H. İCİL:* "FLUOROPHORES IN UNPROCESSED OLIVE EXTRACT: NOVEL APPLICATIONS AND CHARACTERISATION TECHNIQUES" |
| 15:15-15:30 | *D. UZUN, H. İCİL:* "THE EFFECT OF OXIDATION POTENTIALS OF MONO- AND POLYALKENES IN INITIATION OF BIOMIMETIC CASCADE CYCLIZATION OF TERPENOID POLYALKENE VIA PHOTOCHEMICAL ELECTRON TRANSFER" |
| **15:30-16:00** | **Coffee Break /** |
| **16:00-18:00** | **3rd session (oral talks) Chair: Dr. Instructor Ufuk PAKSU** |
| 16:00-16:15 | *P. KARŞILI, M. KUŞ, H. İCİL:* "SYNTHESIS, CHARACTERIZATION, PHOTOPHYSICAL AND ELECTROCHEMICAL PROPERTIES OF NAPHTHALENE DIIMIDE MOLECULES AND THEIR POTENTIAL APPLICATIONS IN ORGANIC ELECTRONICS" |
| 16:15-16:30 | *O. A. OBA, N. P. AYDINLIK:* "PREPARATION OF MESOPOROUS ACTIVATED CARBON FOR PESTICIDE REMOVAL: KINETICS AND EQUILIBRIUM STUDIES" |

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# COMPARISON OF CYPRUS LATE BRONZE AGE BOWL MANUFACTURING METHODS IN PERSPECTIVE OF ARCHEOMETRIC STUDIES

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The determination of the manufacturing techniques of metal artifacts used in prehistoric periods sheds light on the cultural, social, economic, and technological evolution of the era. Identifying the production processes through the metallurgical and chemical characterization of archaeological findings is a noteworthy aspect of archaeometallurgical research.

In 2004, at the Kral Tepesi settlement located in the Kaleburnu village of Karpaz, one of the significant ports of the Late Bronze Age, a hoard consisting of 26 bronze artifacts was discovered inside a storage pithos [1]. The discovery of these artifacts within a storage container, the diversity of the artifacts, and the collective presence of a stirrup jar alongside this assemblage have raised several scientific questions. One of the most intriguing questions is to determine the production processes of these metal-based artifacts. The abundance of bowls, seen as part of both rituals and daily use, reflecting the diverse typology among the artifacts, raises another worthwhile question regarding the possibility of different production methods. Within the scope of this study, the determination of the manufacturing process of the bowls found in the 2004 hoard has been planned based on their internal structure and material properties. For this purpose, Scanning Electron Microscopy (SEM) and its associated chemical analysis unit, Energy Dispersive Spectroscopy (EDS), were employed to examine the surface morphology, shape, size, and distribution of the pieces. X-ray Diffraction (XRD) analyses were conducted to study the crystalline structure. The grain structure, grain orientation, fracture mechanism, and differences in the crystalline structure of the examined artifacts suggest that different production processes may have been employed. From the artifacts that distinctly show the mentioned characterization differences, select samples have been chosen to elucidate their production processes.

This study offers a unique perspective to the scientific community in understanding and comparatively analyzing the different production techniques of the Late Bronze Age bronze bowls found at Kral Tepesi in Cyprus. In light of the findings obtained, an interdisciplinary approach has been emphasized, bridging archaeology, chemistry, and material science, aiming to evaluate the production techniques within a broader evolutionary and cultural context.

**Keywords:** archaeometry, bowl, bronze, kral tepesi, scanning electron microscopy

**References**

[1] Bartelheim M, Kizilduman B, Müller U, Pernicka E, Tekel H (2008) The Late Bronze Age Hoard of Kaleburnu/Galinoporni on Cyprus. Památky Archeologické, 99, 161-188.