



THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

**10th Annual International Conference on
Chemistry
18-21 July 2022, Athens, Greece**

**Edited by
Ellene Tratras Contis & Olga Gkounta**

2022

10th Annual International
Conference on Chemistry
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Olga Gkounta

First published in Athens, Greece by the Athens Institute for Education and
Research.

ISBN: 978-960-598-517-2

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9 Chalkokondili Street
10677 Athens, Greece
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<ol style="list-style-type: none">1. Maria Rosaria D’Acierno Canonici, Associate Professor, Parthenope University of Naples, Italy. <i>Title: Music and Art: Two Underestimated Disciplines.</i>2. Deon Vos, Senior Lecturer, North West University, South Africa. <i>Title: The Influence and Value of Technology in the Education Systems of South Africa and Russia.</i>3. Sara Dias-Trindade, Teacher, University of Coimbra, Portugal. <i>Title: Technologies and Digital Competences in Portuguese Education: History of their Integration in Pedagogical Practices since the Beginning of the 20th Century.</i>4. Javier Cubas, Associate Professor, Polytechnic University of Madrid, Spain. <i>Title: UPMQuBe: An Academic/Educational PocketQube Proposal for the EU2Space Challenge.</i>	<p>of the tour may be adjusted, if there is a need beyond our control. This is a private event organized by ATINER exclusively for the conference participants.</p>
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11:30-13:30 TIME SLOT 6 - MORNING/NOON PRESENTATIONS

<p>Coordinator: Adrian Ionescu, Professor, Wagner College, USA.</p> <ol style="list-style-type: none">1. Haiduke Sarafian, Professor of Physics and Endowed Chair of John T. and Paige S. Smith Professor of Science, Pennsylvania State University, USA. <i>Title: Negative Resistance and Its Impact on a RC-DC Driven Electric Circuit.</i>2. Mahmoud Huleihil, Head, Computer Sciences Department, Bet Berl College Kfar Saba, Israel. <i>Title: General Solution of Two-Dimensional Projectile Motion with Air Resistance.</i>3. Masoud Ghezelbash, Professor, University of Saskatchewan, Canada. <i>Title: Black Holes and Conformal Field Theories.</i>4. Igor Djerdj, Professor, University of Osijek, Croatia. <i>Title: Band Gap Engineering in Novel Fluorite-Type Rare Earth High-Entropy Oxides (RE-HEOs) with Computational and Experimental Validation for Photocatalytic Water Splitting Applications.</i>

13:30-15:00 TIME SLOT 7 - NOON PRESENTATIONS

<p>Coordinator: Masoud Ghezelbash, Professor, University of Saskatchewan, Canada.</p> <ol style="list-style-type: none">1. Adrian Ionescu, Professor, Wagner College, USA. <i>Title: Computer Software Used To Introduce Some New Numerical Methods.</i>2. Dheerendra Kumar Dwivedi, Professor, Indian Institute of Technology Roorkee, India. <i>Title: Joining of Copper-Steel Dissimilar Metals by Pulse Pressure Assisted Diffusion Bonding.</i>3. Alejandro Ramírez-Rojas, Researcher, Autonomous Metropolitan University - Azcapotzalco, Mexico. Elsa Leticia Flores Marquez, Researcher, Autonomous Metropolitan University - Azcapotzalco, Mexico. <i>Title: Correlations of the Seismic Sequences Before and after the 2017 Tehuantepec Earthquake M8.2, Mexico by Using the Visibility Graph Method</i>
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15:00-16:00

Lunch

16:00-17:30 TIME SLOT 8 - AFTERNOON PRESENTATIONS

<p>Coordinator: Olga Gkounta, Researcher, ATINER.</p> <ol style="list-style-type: none">1. Genica Liliana Saftoiu Golea, PhD Student, University of Bucharest, Romania. <i>Title: Vertical Assessment of Characteristics of Medium Thick Clouds over Bucharest-Magurele, Romania.</i>2. Vassil Delchev, Professor, University of Plovdiv, Bulgaria. <i>Title: Excited State Intra- and Intermolecular Proton Transfers in Cytosine and Guanine.</i>3. Mingzhong Li, Professor, De Montfort University, UK.
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Igor Djerdj

Professor, University of Osijek, Croatia

Dalibor Tatar

PhD Student, University of Osijek, Croatia

Josip Juraj Strossmayer

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Professor, University of Exeter, UK

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Postdoc, University of Exeter, UK

&

Aritra Ghosh

Lecturer, University of Exeter, UK

Band Gap Engineering in Novel Fluorite-Type Rare Earth High-Entropy Oxides (RE-HEOs) with Computational and Experimental Validation for Photocatalytic Water Splitting Applications

Five different rare-earth-based high entropy oxides (HEOs) nanoparticles with fluorite type of structure and average crystallite sizes between 6 and 9 nm are prepared and their photocatalytic behaviour towards AZO dye degradation and photoelectrochemical water splitting for hydrogen generation is examined. The cationic site in the fluorite lattice consists of five equimolar elements selected from the group of rare-earth elements including La, Ce, Pr, Eu, and Gd and second-row transition metals, Y and Zr. Studied HEOs exhibit bandgaps in the range from 1.91 eV to 3.0 eV and appropriate valence and conduction bands for water splitting. They reveal high photocatalytic activity that is mostly attributed to the accessibility of more photocatalytic active sites which provided radicals responsible for the AZO dye degradation. The material successfully produces hydrogen by photocatalytic water splitting, suggesting the potential of HEOs as new photocatalysts. The photocatalytic performances of all studied HEOs outperform the single fluorite oxides or equivalent mixed oxides. The $\text{Ce}_{0.2}\text{Zr}_{0.2}\text{La}_{0.2}\text{Pr}_{0.2}\text{Y}_{0.2}\text{O}_2$ engender hydrogen in $9.2 \mu\text{molmg}^{-1}$ per hour that is much higher content than for pristine CeO_2 material which amounts to $0.8 \mu\text{molmg}^{-1}$ per hour.