

# 2nd REUNICE Doctoral Summer School Catania 1-5 July 2024

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## Summer School onsite programme

Day	Time	Teacher/Mentor Affiliation	Course name in brief
01-Jul	Villa Zingali Tetto (Museo della rappresentazione), Via Etnea, 742, 95128 Catania CT		
	8:30-8:50		registration
	8:50-9:00		Welcome address <b>Prof. Cristina Satriano</b> , REUNICE scientific coordinator <b>Prof. Gianluca Cicala</b> , vice Director DICAR <b>Prof. Lucia Zappalà</b> , Deputy Rector Internationalization <b>Prof. Mattia Frasca</b> , Erasmus Institutional Coordinator
	9:00-10:30	<b>Philippe Leclère</b> University of Mons, BE	<b>Scanning probe microscopy – General introduction</b> <i>In materials science, when someone wants to optimize some properties or improve a device's performance, the characterization tools are essential. Most of the time, the physical and the chemical properties of the surface and interfaces have to be determined at the nanoscale to get this information, and a few decades, Scanning Probe Microscopy and Spectroscopy are the key players in answering these crucial points. In these lectures, after a general introduction presenting the different parts of the microscope, we will discuss how to determine at the nanoscale the mechanical, electrical properties of materials that can be used for energy applications (photovoltaics, batteries, energy harvesters, ...) through different imaging and spectroscopic modes.</i>
	10:30-11:00		coffee break
	11:00-13:00	<b>Clara Casado Coterillo</b> University of Cantabria, ES	<b>General characterization of biopolymer (membranes):</b> <i>review of characterization techniques most commonly used to understand the potential and improvements of biopolymers in (membrane) applications.</i>
	13:00-14:30		Lunch break
	14:30-16:00	<b>Clara Casado Coterillo</b> University of Cantabria, ES	<b>Biopolymers in membrane technology (I):</b> <i>overview of the recent examples and challenges of biopolymers to move membrane technology into the circular economy framework.</i>
16:00-16:30		coffee break	
16:30-17:30	<b>Clara Casado Coterillo</b> University of Cantabria, ES	<b>Biopolymers in membrane technology (II):</b> <i>overview of biopolymers' recent examples and challenges to move membrane technology into the circular economy framework.</i>	
17:45			Free time - autonomous dinner

02-Jul	Villa Zingali Tetto (Museo della rappresentazione), Via Etnea, 742, 95128 Catania CT		
	8:30-9:00		registration
	9:00-10:30	<b>Clara Casado Coterillo</b> University of Cantabria, ES	<b>Synthesis of biopolymer based membranes:</b> <i>overview of the biopolymer procedures that were developed for existing membranes and their adaptations to biopolymer-based technology.</i>
	10:30-11:00		coffee break
	11:00-13:00	<b>Clara Casado Coterillo</b> University of Cantabria, ES	<b>Application potential of biopolymer based membranes in CO<sub>2</sub> capture and utilization:</b> <i>a summary of recent developments in literature and our research group and collaborations.</i>
	13:00-14:30		Lunch break
	14:30-16:00	<b>Philippe Leclère</b> University of Mons, BE	<b>About the piezoelectric and thermoelectric properties of materials at the nanoscale: the case of energy harvesters</b>
16:00-16:30		coffee break	
16:30-17:30	<b>Philippe Leclère</b> University of Mons, BE	<b>The next step: multifunctional characterization platform and correlative data analysis</b>	
17:45			Free time - autonomous dinner

03-Jul	Villa Zingali Tetto (Museo della rappresentazione), Via Etnea, 742, 95128 Catania CT		
	8:30-9:00		registration
	9:00-10:30	<b>Michał Niemczak</b> Poznan University of Technology, PL	<b>Creative design of new multifunctional compounds - in the search of attractive cation-anion combinations for the modern pharmaceutical, agrochemical and surfactant industry (I)</b> <i>The search for new multifunctional compounds, specifically targeting innovative cation-anion combinations, holds significant potential for advancements in the pharmaceutical, agrochemical, and surfactant industries.</i>
10:30-11:00		coffee break	
11:00-12:30	<b>Michał Niemczak</b> Poznan University of Technology, PL	<b>Creative design of new multifunctional compounds - in the search of attractive cation-anion combinations for the modern pharmaceutical, agrochemical and surfactant industry (II)</b> <i>Therefore, in the framework of the following course, recent research on the development of quaternary ammonium salts (QASs), known for their effectiveness across these applications, will be thoroughly discussed.</i>	

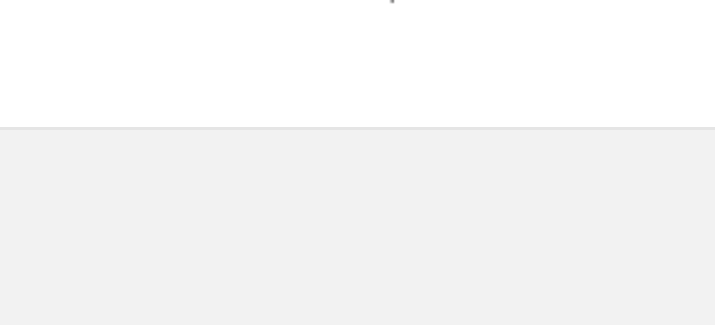
03-Jul (common programme with the Workshop)	12:30-13:00	shuttle transfer from Piazza Repubblica ( <a href="https://maps.app.goo.gl/RJ5Bf5aIHwwjFhpw5">https://maps.app.goo.gl/RJ5Bf5aIHwwjFhpw5</a> ) to Scuola Superiore Catania ( <a href="https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6">https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6</a> )		
	13:00-14:30	Registration + Lunch break		
	14:30-14:45	Welcome		
	14:45-15:40	invited keynote (K1)	<b>Materials and systems for green hydrogen production and storage: challenges and opportunities</b> <i>Sabrina Sartori, University of Oslo</i>	
	poster P1	<b>Application of aluminium-coated membranes for the immobilization of enzymes: model reactions for the evaluation of enzyme activity</b> <i>Aleksandra Rybak, Poznan University of Technology</i>		
	poster P2	<b>Solid-state modification of poly(butylene terephthalate) with a photoreactive Cinnamamide monomer</b> <i>Jacques Kevin Wandji, University of Mons</i>		
	poster P3	<b>Novel multimetallic complexes as precursors for fluoride functional materials</b> <i>Silvia Barbagallo, University of Catania</i>		
	poster P4	<b>Single-Ion Counting with an Ultra-Thin-Membrane Silicon Carbide Sensor for Quantum Applications</b> <i>Enrico Sangregorio, University of Catania</i>		
	poster P5	<b>Boron doped Zinc Oxide thin film as ETL alternative candidate in Perovskite single-junction solar cell</b> <i>Fiorella Tringali, University of Catania</i>		
	poster P6	<b>250 µm thick detectors for neutron detection: design, electrical characteristics, and detector performances</b> <i>Gabriele Trovato, University of Catania</i>		
	poster P7	<b>Earth-abundant nanostructures for energy storage applications</b> <i>Maria Chiara Spadaro, University of Catania</i>		
	poster P8	<b>Work function evaluation of thin films for solar cells by Ambient Pressure Photoemission</b> <i>Vanna Torrisi, University of Catania</i>		
	poster P9	<b>Manufacture and optimisation of ZnO-based high-frequency transistors</b> <i>Beda Altavag, Université technique Hauts-de-France</i>		
	poster P10	<b>Can surface-active ionic liquids based on caprylic acid be a green alternative to surfactants in detergent production?</b> <i>Marta Wojcieszak, Poznan University of Technology</i>		
	poster P11	<b>Membrane reactor supported with ionic liquid as an efficient platform for removal of estrogens</b> <i>Oliwia Degorska, Poznan University of Technology</i>		
	poster P12	<b>Mechanochemical Synthesis as a Proecological Approach of Production of MOF-type materials</b> <i>Weronika Badzinska, Poznan University of Technology</i>		
	poster P13	<b>Synthesis of modern hydrogel polymer electrolytes</b> <i>Wiktorja Zyla, Poznan University of Technology</i>		
	poster P14	<b>Mechanism of aqueous electrolyte uptake by the hydrophilic lignin gel and its application as electrolyte for supercapacitor</b> <i>Amelia Klimel, Poznan University of Technology</i>		
	poster P15	<b>Ionic liquids comprising alkyl betaine cation and iodosulfuron-methyl anion as novel effective herbicides with reduced environmental impact</b> <i>Adriana Olejniczak, Poznan University of Technology</i>		
	poster P16	<b>Interaction of surfactants of natural origin with phospholipid membrane</b> <i>Adam Grzywacz, Poznan University of Technology</i>		
	poster P17	<b>Precipitation of Platinum Group Metal Nanoparticles in Bioinspired Systems</b> <i>Wiktorja Stachowicz, Poznan University of Technology</i>		
	poster P18	<b>Impact of potentially protective agents on lactic acid bacteria in probiotic formulations</b> <i>Natalia Burdaga, Poznan University of Technology</i>		
	poster P19	<b>Perovskite-based surfaces as photoanodes for an enhanced solar-driven CO<sub>2</sub> reduction to formate</b> <i>Jose Antonio Abarca, University of Catania</i>		
	poster P20	<b>Potential integration of osmotic pumps and magnetic nanoparticles in the development of novel drug delivery systems</b> <i>David Navarro Tumbar, University of Cantabria</i>		
	poster P21	<b>Valorization of polluted biomass waste for the fabrication of Gas Diffusion Electrodes for CO<sub>2</sub> electroreduction to formate</b> <i>Isler Uriarte-Portes, University of Cantabria</i>		
	poster P22	<b>Photoelectrochemical conversion of CO<sub>2</sub> with perovskite-based materials</b> <i>Mario Alonso Muñoz, University of Cantabria</i>		
	poster P23	<b>Enhancing Electrochemical CO<sub>2</sub> Reduction: Improved Performance of a Three-Compartment Reactor for Formic Acid Production</b> <i>Mario Coz-Cruz, University of Cantabria</i>		
	poster P24	<b>Sustainable technologies for the extraction and separation of strategic raw materials for lithium-ion batteries: an innovative development</b> <i>Nerea Garcia Gomez, University of Catania</i>		
	poster P25	<b>Ni-decorated CaTiO<sub>3</sub>/WO<sub>3</sub>/BiVO<sub>4</sub> layered photoanodes for photoelectrocatalytic hydrogen production</b> <i>Gabriela Garcia Basté, University of Cantabria</i>		
	poster P26	<b>Evaluation of photoexcited charge carriers of CdS/TiO<sub>2</sub> heterojunction for photocatalytic hydrogen production</b> <i>Gabriela Garcia Basté, University of Cantabria</i>		
	poster P27	<b>Sodium alginate surface-modified magnetic materials for microplastics separation</b> <i>Daniel Aragón, University of Cantabria</i>		
	poster P28	<b>Synthesis and multi-scale characterization of Zinc Oxide Nanowires</b> <i>Imen Benkhaled, University of Mons</i>		
	poster P29	<b>On the Importance of a Correct Data Acquisition Protocol of the Electromechanical Properties of Materials for Energy Harvesting Applications: Piezoelectric Nanocomposites as a Case Study</b> <i>Pierre Nickmilder, University of Mons</i>		
	poster P30	<b>Synthesis of New Biocompatible Materials Based on Alginic Acid with Antibacterial Activity</b> <i>Erika Saccullo, University of Catania</i>		
	poster P31	<b>Root-associated microorganisms for optimizing biological control in tomato</b> <i>Mariangela Milordo, University of Catania</i>		
	poster P32	<b>Nanostructuring of GaN: A Promising Route to Quantum Single-Photon Sources</b> <i>Antouman Sallab, University of Catania</i>		
	poster P33	<b>Enhancing Energy Consumption Forecasting Accuracy through Automated Machine Learning</b> <i>Francesco Zito, University of Catania</i>		
	poster P34	<b>Frontiers in nanomedicine: unlocking wound healing potentials with PVP capped gold and silver nanoparticles and nanorods</b> <i>Alice Foti, University of Catania</i>		
poster P35	<b>Spin orbit coupling effects in a graphene Josephson junction</b> <i>Federico Bonasera, University of Catania</i>			
poster P36	<b>Circuit Quantum Electrodynamics with two-dimensional materials-based devices</b> <i>Vincenzo Varrica, University of Catania</i>			
poster P37	<b>Fully integrated galvanic isolation interface in GaN technology</b> <i>Katia Sampet, University of Catania</i>			
poster P38	<b>Towards sustainable polyester resins: from trimerization to bio-based additives for a greener thermoset and composite manufacturing</b> <i>Giuliana Rizzo, University of Catania</i>			
17:40	shuttle transfer from Scuola Superiore ( <a href="https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6">https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6</a> ) to Monastero Benedettini ( <a href="https://maps.app.goo.gl/PrX4udpJ5o7EHgEgB">https://maps.app.goo.gl/PrX4udpJ5o7EHgEgB</a> )			
18:00-20:00	Guided tour of Monastero Benedettini			
20:15	Social dinner, city center (Idria Events Center)			

04-Jul	Villa Zingali Tetto (Museo della rappresentazione), Via Etnea, 742, 95128 Catania CT		
	8:30-9:00		registration
	9:00-10:30	<b>Michał Niemczak</b> Poznan University of Technology, PL	<b>Creative design of new multifunctional compounds - in the search of attractive cation-anion combinations for the modern pharmaceutical, agrochemical and surfactant industry (III)</b> <i>Pharmaceuticals rely on QASs compounds for improved drug delivery systems and enhanced therapeutic effects. Agrochemicals benefit from these innovations by improving crop protection and soil health through more efficient and environmentally friendly solutions. Surfactants, essential in various industries, achieve better performance and biodegradability through optimized cation-anion combinations. In pharmaceuticals, QASs demonstrate promising antibacterial and antifungal properties, crucial for developing new medications. In agrochemicals, they offer enhanced pest and weed control while minimizing environmental impact. In the case of surfactants, appropriately designed QASs can contribute to enhanced wetting or cleaning properties with simultaneous biocidal activity, which is highly beneficial in the context for seeking for improved product performance.</i>
	10:30-11:00		coffee break
	11:00-13:00	<b>Michał Niemczak</b> Poznan University of Technology, PL	<b>Creative design of new multifunctional compounds - in the search of attractive cation-anion combinations for the modern pharmaceutical, agrochemical and surfactant industry (IV)</b> <i>Current advancements in QASs research show significant improvements in the stability and bioavailability of these compounds, making them more effective and safer for use. Future prospects that will be discussed include the continued exploration of novel cation-anion combinations tailored for properties specifically to industry needs. This ongoing research aims to create compounds that are not only highly functional but also sustainable and environmentally friendly, ensuring a positive impact on health, agriculture, and industry.</i>
	13:00-14:30		lunch break
14:45	shuttle transfer from Villa Zingali Tetto (Museo della rappresentazione), Via Etnea, 742, 95128 Catania CT ( <a href="https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6">https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6</a> ) to Polo Tecnologico, Via S. Sofia, 102, 95123 Catania CT ( <a href="https://maps.app.goo.gl/5mw9B5E7euWwlg5F3">https://maps.app.goo.gl/5mw9B5E7euWwlg5F3</a> )		
15:00-18:00	<b>Laboratory activity</b> (training and supervision: Gianluca Cicala and Claudio Tosto, UNICT; Philippe Leclère, UMONS; Michał Niemczak, PUT)		
18:00-19:00	coffee break/happy hour		
19:00-	Shuttle transfer from Polo Tecnologico, Via S. Sofia, 102, 95123 Catania CT ( <a href="https://maps.app.goo.gl/5mw9B5E7euWwlg5F3">https://maps.app.goo.gl/5mw9B5E7euWwlg5F3</a> ) to Piazza Repubblica ( <a href="https://maps.app.goo.gl/RJ5Bf5aIHwwjFhpw5">https://maps.app.goo.gl/RJ5Bf5aIHwwjFhpw5</a> )		
19:30-	Free time, autonomous dinner		

05-Jul (common programme with the Workshop)	09:00	Shuttle transfer from Piazza Repubblica ( <a href="https://maps.app.goo.gl/RJ5Bf5aIHwwjFhpw5">https://maps.app.goo.gl/RJ5Bf5aIHwwjFhpw5</a> ) to Scuola Superiore Catania ( <a href="https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6">https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6</a> )	
	09:30-10:10	invited Talk (T3)	<b>Nature-mimicking intelligent micro/nanorobots</b> <i>Mario Liso, University of Catania</i>
	10:10-10:30	Oral (O13)	<b>Facile synthesis of sulfurized MoO<sub>3</sub> nanostructures from industrial waste powder for energy storage application</b> <i>Federico Ursino, University of Catania</i>
	10:30-10:50	Oral (O14)	<b>On the Electromechanical Properties of Hybrid Piezoelectric Nanocomposites by Scanning Probe Microscopy</b> <i>Pierre Nickmilder, University of Mons</i>
	10:50-11:10	Oral (O15)	<b>Impact of rare earth doping in transition metal oxide nanoparticles and electrochemical sensing of aromatic alcohols in polluted wastewater</b> <i>Angelo Ferlazzo, University of Catania</i>
	11:10-11:30		coffee break
	11:30-11:50	Oral (O16)	<b>Utilizing contact lens-waste-TiO<sub>2</sub> Nanocomposites for sustainable wastewater remediation</b> <i>Ernesto Luchini, University of Catania</i>
	11:50-12:10	Oral (O17)	<b>Creative management of waste from production of sugar - glucose betaine as the future for the agrochemicals and surfactants market</b> <i>Michał Niemczak, Poznan University of Technology</i>
	12:10-12:30	Oral (O18)	<b>Fluka Monte-Carlo simulations of Neutron Detection for Fusion Reactors</b> <i>Alfio Samuele Mancuso, University of Catania</i>
	12:30-12:50	Oral (O19)	<b>New lidocaine derivatives showing antimicrobial activity as new APIs with low environmental impact</b> <i>Adriana Olejniczak, Poznan University of Technology</i>
	12:50-14:30		lunch break
	14:30-14:50	Oral (O20)	<b>Exploring the Nanoscale Electromechanical Properties of Lead-free Thin Films and Nanostructures for Energy Harvesting Applications</b> <i>Philippe Leclère, University of Mons</i>
	14:50-15:10	Oral (O21)	<b>Cu Nanoparticles by Laser Ablation in Liquid for green hydrogen production</b> <i>Cristiano Lo Du, University of Catania</i>
	15:10-15:30	Oral (O22)	<b>Design of porous carbon electrodes for energy storage systems</b> <i>Amelia Klimel, Poznan University of Technology</i>
	15:30-15:50	Oral (O23)	<b>Iron Oxide based Nanocomposites for sustainable fertilization</b> <i>Vanna Torrisi, University of Catania</i>
	15:50-16:10	Oral (O24)	<b>Photocatalysts for Green Hydrogen Production: Electrochemical and Morphological Study</b> <i>Gabriela Garcia Basté, University of Cantabria</i>
	16:10-16:30		coffee break
	16:30-16:50	Oral (O25)	<b>Intrinsic Doping and Ageing of Sputter Deposited In<sub>2</sub>O<sub>3</sub> thin films</b> <i>Andrés Lo Masco, University of Catania</i>
	16:50-17:10	Oral (O26)	<b>Magnetic nanoparticles with green surface modifications for the efficient capture of polyethylene microplastics</b> <i>Daniel Aragón, University of Cantabria</i>
	17:10-17:30	Oral (O27)	<b>Photocatalytic Thermoplastic Coatings Layered onto Cement Surfaces for Gaseous Pollutants Abatement</b> <i>Giulia Faciti, University of Catania</i>
	17:30-17:40	Closing works	
	17:40	shuttle transfer from Scuola Superiore Catania ( <a href="https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6">https://maps.app.goo.gl/ZmDyW8pX3QkQBqV6</a> ) to Piazza Repubblica ( <a href="https://maps.app.goo.gl/RJ5Bf5aIHwwjFhpw5">https://maps.app.goo.gl/RJ5Bf5aIHwwjFhpw5</a> )	
	18:00	Free time, autonomous dinner	

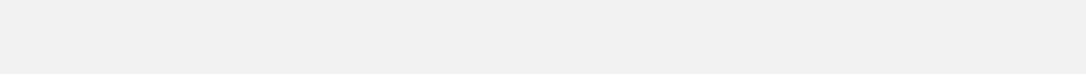
### SCIENTIFIC COMMITTEE

- Prof. Gianluca Cicala – Department of Civil Engineering and Architecture - UNICT
- Dr. Salvatore Greco – Department of Economy and Business - UNICT



### ORGANIZING COMMITTEE

- Prof. Cristina Satriano – Department of Chemical Sciences - UNICT REUNICE Project Leader
- Pasqua Meccariello - UNICT REUNICE Project Officer
- Dr. Valentina Barbagallo - UNICT International Relation Office, Coordinator
- Gabriele Bonfanti, Giorgio Lo Cicero, Francesco Messina - UNICT REUNICE Student Board
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