Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA
SAFI3 INNOVATIVA INTERDISCIPLINARE INTERNAZIONALE

SPRING SCHOOL

The Future is Chemistry

30th March-2nd April 2026

Registration must be done through the following link by 20th March 2026:
https://docs.google.com/forms/d/e/1FAIpQLSdSm4LYBS6K8triE58vTYruIE7r2rFTKPqkj0yYi3Xp7gg2w/viewform

PROMOSSO DA

Università di Catania | Scuola Superiore di Catania Mediterranean University Center

ORGANIZZATO DA

Unict Scienze Chimiche

Sinergie per orientare e promuovere un'Alta Formazione Innovativa, Interdisciplinare, Internazionale
Avviso 594 del 26-04-2024_Codice progetto: SSU2024-00003 - CUP SSC: E62B24000380001

Missione 4 ● **Istruzione e Ricerca**

Conference Program

Monday 30th: 8:30-9:00 - Registration
9:00-9:15 - Opening of the Conference

Thursday 2nd: 10:00-10:15
Greetings from **Prof. Ida Nicotra**, President of the **Scuola Superiore di Catania**

Monday 30th	Tuesday 31st	Wednesday 1st	Thursday 2nd
Energy and Materials	**Health and environment**	**Syntheses and products**	**Paper writing, Research proposal, and Ethical issues**
9:15-10:15 **M. Rohnke** 10:15-11:15 **A. Ciesielski**	9:00- 10:00 **M. Rohnke** 10:00-11:00 **A. KARAKEÇİLİ**	9:00-10:00 **A. Minassi** 10:00- 11:00 **P. Vitale**	8:30-10:00 **A. Jiménez Rivero** 10:00-10:15 - **I. Nicotra**
11:15-11:45 **Coffee break**	11:00-11:30 **Coffee break**	11:00-11:30 **Coffee break**	10:15-10:30 **Coffee break**
11:45-12:45 **G. Bengasi** 12:45-13:45 **Flash oral**	11:30-12:30 **A. Speghini** 12:30-13:30 **E. Paone**	11:30-12:30 **C. Pezzella** 12:30-13:30 **Flash oral**	10:30-11:30 **A. Jiménez Rivero** 11:30-12:30 **S. Sortino** 12:30-13:30 **A. Terrasi**
13:45-15:00 **Lunch**	13:30-14:30 **Lunch**	13:30-14:30 **Lunch**	13:30-15:00 **Lunch**
15:00-16:00 **W. Knoll** 16:00-17:00 **V. Spampinato**	14:30-15:30 **C. Satriano** 15:30-16:30 **R. Fiorenza**	14:30-15:30 **C. Talotta** 15:30-16:30 **C. Fortuna**	
17:00-19:00 **Poster Session** *(with reception)*	16:30-17:00 **Coffee break**	16:30-17:00 **Coffee break**	
	17:00 Visit to the Monastery of Benedettini + Social Dinner	17:00-19:00 **A. Jiménez Rivero**	

List of Invited Speakers

Dr. Giuseppe Bengasi
3SUN srl (Enel group)

Dr. Artur Ciesielski
Université de Strasbourg, CNRS, ISIS, Strasbourg, France & Centre for Advanced Technologies, Adam Mickiewicz University, Poznań, Poland.

Prof. Roberto Fiorenza
Department of Chemical Sciences, University of Catania

Prof. Cosimo Gianluc Fortuna
Department of Chemical Sciences, University of Catania

Dr. Ana Jiménez-Rivero
Universidad Politécnica de Madrid, Spain

Prof. Dr. Ayşe Karakeçili
Ankara University Chemical Engineering Department

Prof. Dr. Wolfgang Knoll
Laboratory for Life Sciences and Technology (LiST), Danube Private University, Krems an der Donau, Austriat

Prof. Alberto Minassi
Dipartimento di Scienze del Farmaco, Università del Piemonte Orientale

Prof. Emilia Paone
Università degli Studi Mediterranea di Reggio Calabria

Prof. Cinzia Pezzella
Department of Chemical Sciences, University of Napoli, Federico II,

Prof. Dr. Marcus Rohnke
Institute of Physical Chemistry and Center for Materials Research, Justus Liebig University Gießen - Germany

Prof. Cristina Satriano
NanoHybrid BioInterfaces Laboratory (NHBIL), Department of Chemical Sciences, University of Catania, Catania, Italy

Prof. Valentina Spampinato
Department of Chemical Sciences, University of Catania

Prof. Adolfo Speghini
NRG, Department of Biotechnology, University of Verona

Prof. Salvatore Sortino
Department of Drug and Health Sciences, University of Catania

Prof. Carmen Talotta
Department of Chemistry and Biology "A. Zambelli", University of Salerno (UNISA)

Prof. Antonio Terrasi
Department of Physics and Astronomy, University of Catania

Prof. Paola Vitale
Department of Pharmacy-Drugs Sciences - University of Bari "Aldo Moro"

Invited Speakers

Dr. Giuseppe Bengasi

3SUN srl (Enel group)

Short bio

PhD in Materials Chemistry (Cum Laude, 2020) and recipient of the FNR "Outstanding PhD Thesis" award. With research experience at LIST and the University of Mainz. He's a specialist in thin film depositions, photovoltaic devices and industrial processes. Since 2020, he has contributed to the R&D team at 3SUN, Europe's largest solar module manufacturing facility, focusing on the industrial development of tandem Silicon/Perovskite solar cells and industrial scalability

Photovoltaic devices from R&D to industrial manufacturing

Summary of the lecture

As Europe navigates a historic energy revolution toward net-zero, renewable technologies are fundamentally reshaping global geopolitical and economic equilibria. This lecture examines how current geopolitical shifts are driving the global energy scenario and the strategic acceleration of photovoltaics. We will provide a technical analysis of leading PV advancements, specifically **Heterojunction (HJT)** architecture, industrial workflows, and the critical role of **bifaciality**.

Transitioning toward the future, we will explore Silicon/Perovskite tandem devices—technologies currently breaking all known efficiency records. These innovations are evaluated against international energy objectives and the industrial hurdles Europe must overcome to achieve energy sovereignty. Using 3SUN as a primary case study, the session demonstrates R&D and innovation are evolving developing new functions in a modern tech-company to lead within a complex and rapidly evolving global context

Invited Speakers

Dr. Artur Ciesielski

Université de Strasbourg, CNRS, ISIS, Strasbourg, France & Centre for Advanced Technologies, Adam Mickiewicz University, Poznań, Poland.

Short bio

Artur Ciesielski is a CNRS Research Director (DR2) at the Université de Strasbourg in France and a visiting Professor at Adam Mickiewicz University in Poznań, Poland. His research focuses on the design, synthesis, and application of functional two-dimensional materials, including covalent organic frameworks (COFs), and transition metal dichalcogenides, for energy storage, sensing, and environmental applications. His research has been recognized with prestigious awards such as the Catalán-Sabatier Award (2022) and the Outstanding Pole in France Award (2019). Committed to bridging academia and industry, His interdisciplinary approach combines materials chemistry and engineering to address global challenges in energy, health, and sustainability.

2D Covalent Organic Frameworks and Their Hybrids: Bridging Synthesis and Application

Summary of the lecture

Two-dimensional Covalent Organic Frameworks (2D COFs) have gained significant attention as an emerging class of crystalline porous materials with tunable structures, exceptional stability, and diverse functionalities. Their well-defined molecular architecture, high surface area, and chemical versatility make them promising candidates for a wide range of applications, particularly in energy storage. Additionally, the integration of COFs with other functional materials to form hybrid structures unlocks new properties, expanding their potential beyond pristine frameworks. In this talk, I will delve into the fundamental aspects that govern the design and synthesis of 2D COFs and their hybrids, emphasizing key strategies to enhance crystallinity, tailor porosity, and introduce functional groups that modulate electronic and electrochemical behavior. Building on this foundation, I will explore how these structural features translate into performance enhancements for energy storage applications. Particular emphasis will be placed on the role of 2D COFs and their hybrids in supercapacitors and batteries, highlighting recent advances in redox-active frameworks, charge storage mechanisms, and ion transport dynamics. By bridging fundamental principles with practical applications, this presentation will provide a holistic perspective on the potential of 2D COFs as next-generation materials for sustainable energy technologies.

Invited Speakers

Prof. Roberto Fiorenza

Department of Chemical Sciences, University of Catania

Short bio

Roberto Fiorenza is Associate Professor of Industrial Chemistry at the University of Catania. His research focuses on the synthesis and characterization of catalytic materials for environmental and energy applications, with emphasis on photocatalysis and hybrid approaches, including unconventional materials. He has received several awards for his research. His teaching activity highlights sustainability in Industrial Chemistry and heterogeneous catalysis.

Solar photothermo-catalysis for environmental protection

Summary of the lecture

The urgent demand for sustainable catalytic routes applied to air purification and CO_2 valorization has stimulated growing interest in hybrid approaches. Among these, photothermo-catalysis emerges as a highly promising strategy, combining the efficiency of thermocatalysis with the sustainability of photocatalysis. This synergy enhances catalytic performance while reducing energy consumption compared with single-mode processes. The lecture will address solar-driven photothermo-catalytic conversion of CO_2 and volatile organic compounds (VOCs) using noble-metal-free catalysts. An innovative integrated pathway will also be presented, where CO_2 generated from VOC catalytic oxidation is subsequently converted into solar fuels, transforming air pollutants into value-added products. Benefits and limitations toward scale-up will be critically discussed to outline efficient and sustainable solutions for environmental protection.

Invited Speakers

Prof. Cosimo Gianluca Fortuna

Department of Chemical Sciences, University of Catania

Short bio

Cosimo Gianluca Fortuna is Associate Professor of Organic Chemistry at the Università di Catania, where he teaches and supervises PhD research. He has authored 100 publications (h-index 27) and leads national and international projects in heterocyclic chemistry and drug design. Since 2025 he serves as Delegate for Orientation Policies and is President of the Società Chimica Italiana – Sicily Section.

From design to in vitro evaluation, through synthesis: a new way of being an organic chemist.

Summary of the lecture

The lecture outlines my evolution from synthetic organic chemist to researcher integrating molecular modeling and drug design. My work focuses on the rational design of heterocyclic compounds with antitumor, antibacterial, and anti-inflammatory activity. By combining organic synthesis with virtual screening tools such as VolSurf, FLAP, docking, and KNIME workflows, we developed predictive models and identified active compounds, including patented antibacterial agents. Recent research targets COX-1 inhibitors and bioactive natural products, particularly within the “Frastuca” project on pistachio extracts. The common thread is the integration of computational chemistry and experimental validation to design biologically active molecules efficiently.

Invited Speakers

Dr. Ana Jiménez-Rivero

Universidad Politécnica de Madrid, Spain

Short bio

PhD in Technological Innovation in Building from Universidad Politécnica de Madrid (2016), Building Surveyor from University of Salamanca (2010). Currently a member of the Institute of Educational Sciences and vice-director of the Centre of Leadership and Technology at UPM. Vice-president of Education of a Toastmasters public speaking club, 2019-2025. Founder of the Scientific Storyline framework, with which she supports researchers in finding their voice to communicate research ideas.

Public speaking techniques in academic contexts

Summary of the lecture

Unclear communication can reduce the impact of research. This lecture is designed to help researchers develop their communication skills, providing practical techniques for preparing and delivering oral presentations, including time management. After the lecture, you will be able to identify and apply oral communication techniques and reflect on your performance in delivering your oral discourse.

Contents

- Essential oral communication techniques, related to:
  - Clarity of intention
  - Discourse structure
  - Communication skills
  - Connection with the audience
  - Time management
- Recommendations to continue developing communication skills

The two sessions combine theories on public speaking, moments of reflection, and formative assessment. In the first session, participants become familiar with oral communication techniques and impromptu speaking. In the second session, each participant gives a brief oral presentation (up to 2 minutes) and receives feedback.

Invited Speakers

Prof. Dr. Ayşe Karakeçili

Ankara University Chemical Engineering Department

Short bio

Prof. Karakeçili is a full-time professor in Ankara University Chemical Engineering Department since 2010. She served as a visiting researcher in University of Catania and Columbia University Biomedical Engineering Department. Prof. Karakeçili's research group focuses on the innovative biomaterial design and exploring new materials in tissue engineering applications including bone, cartilage and osteochondral regeneration and wound treatment.

Metal-organic Frameworks in Tissue Engineering Applications: Crossing Kingdoms

Summary of the lecture

The synergy between materials science and biomedical applications spans virtually every class of material—so much so that it can rightfully be described as an inseparable partnership. A material originally engineered for an entirely different purpose can evolve into a highly valuable biomaterial, provided it demonstrates compatibility with biological tissues. MOFs consist of metal ions linked together by organic bridging ligands. These crystalline materials have applications in clean energy as storage media for gases such as hydrogen and methane and as high-capacity adsorbents as well as in nonlinear optics and magnetic and electronic devices. Their exceptional properties have also attracted the biomaterials field. Shortly after the biomaterial researchers have winked to MOF structures the publications came one after another. These compelling alternative nanostructures are increasingly securing their place at the forefront of groundbreaking innovations in biomaterials and tissue engineering.

Invited Speakers

Prof. Dr. Wolfgang Knoll

Laboratory for Life Sciences and Technology (LiST), Danube Private University, Krems an der Donau, Austriat

Short bio

Wolfgang Knoll earned a PhD degree in Biophysics from the University of Konstanz in 1976. From 1993 to 2008 he was the director of the Materials Science Department at the Max Planck Institute for Polymer Research in Mainz, Germany, was from 2008 to 2023 the Scientific Managing Director of the AIT Austrian Institute of Technology in Vienna, Austria, and works as a Honorary Professor at DPU since 2020. Since 2010 he is a Regular Member of the Austrian Academy of Sciences, received in 2012 an Honorary Doctorate from the University of Twente, the Netherlands, and became a member of the Academia Europaea in 2017..

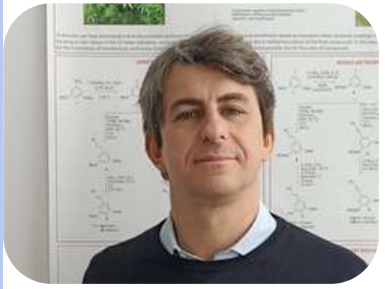
Sensing Smell

Summary of the lecture

For the sensing of light or for recording sound we have devices with amazing performance parameters. Only for chemical communication, for smell or taste detection on a technical level we have (nearly) nothing, despite the fact that the monitoring of chemicals in chemotaxis, i.e., in the search for food of many organisms or the exchange of chemicals between species as a way to communicate with each other is the oldest member of our sensory repertoire.

What we try in our research is a bio-mimetic approach, a bio-electronic nose. We want to merge the world of ultrasensitive microelectronic devices like transistors as the transducer platform and couple it with the "living" world of bio functional building blocks. We are aiming at emulating the sensitivity and selectivity of certain protein structures, e.g., odorant binding proteins, towards recognizing and binding their ligands, i.e., the odorants we want to smell or the volatile toxins that we want to monitor, with the versatility of microelectronics.

Invited Speakers



Prof. Alberto Minassi

Dipartimento di Scienze del Farmaco, Università del Piemonte Orientale

Short bio

Alberto Minassi is Associate Professor in Organic Chemistry at Dipartimento di Scienze del Farmaco of Università del Piemonte Orientale. His research activity takes inspiration from natural products to solve problems in organic chemistry and medicinal chemistry. He is interested in discovery of new and more potent curcumin derivatives as anti-inflammatories and in the exploration of the photoreactivity of easily available natural products to identify new scaffolds with interesting bioactivities.

Natural Products as Lego Bricks: Reassembling Molecular Scaffolds to Discover Novel Bioactive Structures

Summary of the lecture

For an organic chemist, natural products are like a box of Lego bricks: modular, versatile building blocks that can be assembled and reassembled to create entirely new architectures. Secondary metabolites, in particular, provide structurally complex and highly functionalized frameworks that are ideal starting points for molecular innovation. In this talk, I will describe how we use light, Lewis acids, and other tools of modern organic chemistry to reorganize and transform these natural scaffolds. By strategically breaking and reforming bonds, we can reassemble secondary metabolites into novel molecular structures with diverse and often enhanced biological profiles. Our approach combines photochemical activation, Lewis acid catalysis, and rational reaction design to unlock new chemical space from existing natural products, ultimately enabling the discovery of compounds with promising biological activity.

Invited Speakers

Prof. Emilia Paone

Università degli Studi Mediterranea di Reggio Calabria

Short bio

Emilia Paone is a Fixed-Term Researcher (RTD-B) at the Università degli Studi Mediterranea di Reggio Calabria. Her research focuses on heterogeneous catalysis, with particular emphasis on the sustainable valorization of waste and residues for the green production of high value-added chemicals. She serves on the editorial boards of international journals in catalysis and green and sustainable chemistry and is actively involved in SCI, EYCN and IUPAC.

Make Waste Great Again: Catalysis for Circular Valorization

Summary of the lecture

The transition toward a more sustainable society requires rethinking how we use resources, design materials and manage waste. The growing accumulation of agro-industrial, plastic and electronic waste, together with the rising demand for critical raw materials (CRMs), calls for scalable circular solutions where waste becomes an opportunity aligned with environmental protection and human well-being. This talk presents heterogeneous catalysis as a platform to transform complex waste streams into value-added chemicals, fuels and recoverable resources. By combining advanced catalytic materials with circular thinking, we aim to extend material lifetimes, reduce dependence on CRMs, and redefine waste as a key feedstock for sustainable chemical manufacturing, supporting environmental resilience and public health. This is more than valorization, it is a shift in perspective, where catalysis drives circularity and waste becomes a source of value.

Invited Speakers

Prof. Cinzia Pezzella

Department of Chemical Sciences, University of Napoli, Federico II,

Short bio

Associate Professor of Chemistry and Fermentation Biotechnology at the Federico II University. She holds a PhD in Industrial Biotechnology and her work spans sustainable biotechnologies, bio-based materials, and biomass valorization. Her academic activity integrates research, higher education, and scientific leadership. She currently coordinates the national PRIN project BRAIN and is involved in international project partnerships focused on circular economy and sustainable material development.

Designing Sustainable Materials from Biomass Waste: The Polyhydroxyalkanoate Platform

Summary of the lecture

This lecture explores the design of sustainable materials from biomass waste, highlighting polyhydroxyalkanoates (PHAs) as a versatile platform of bio-based and biodegradable polymers. After introducing PHA biosynthesis, structural diversity, and key properties, the discussion addresses current technological and economic challenges limiting large-scale adoption. Emphasis is placed on integrated strategies combining waste valorization, microbial process design, and polymer tailoring. Through selected case studies involving cardoon biomass and spent coffee grounds, the lecture illustrates how biorefinery concepts enable cascading extraction of valuable fractions, efficient conversion of renewable feedstocks into PHAs, and development of advanced material formulations. These examples demonstrate how green chemistry, biotechnology, and materials science converge to transform agro-waste into functional products, supporting circular economy models and future industrial symbiosis.

Invited Speakers

Prof. Dr. Marcus Rohnke

Institute of Physical Chemistry and Center for Materials Research
Justus Liebig University Gießen - Germany

Short bio

Marcus Rohnke is Professor of Physical Chemistry at Justus Liebig University Giessen. His scientific work focuses on the investigation of reactions and transport in materials science sample systems using secondary ion mass spectrometry. His current work centres on both biological and battery systems. He is Principal Investigator in the German Cluster of Excellence for Post Lithium Batteries (POLIS). He is author/co-author of more than 140 scientific publications.

Next Generation Batteries for Energy Storage

Summary of the lecture

In order to become climate neutral, we must avoid CO_2 emissions as much as possible. To convert our energy supply accordingly, we must generate electricity primarily from sustainable sources such as solar or wind energy. Sicily is currently developing into Italy's solar hub. However, the energy generated in this way is not usually available when it is needed, which is why temporary storage, e.g. in batteries, is necessary.

Highly suitable and well-developed lithium-ion batteries already exist for this purpose. However, to meet the exponentially growing global demand and sustainability requirements, it is essential to develop new battery concepts and use other battery chemistries. On the one hand, the element lithium is not available in sufficient quantities, and on the other hand, some elements such as cobalt are mined in countries where mining conditions are ethically questionable. This lecture provides an insight into novel battery concepts - from solid state towards Mg batteries.

Invited Speakers

Prof. Dr. Marcus Rohnke

Institute of Physical Chemistry and Center for Materials Research
Justus Liebig University Gießen - Germany

Short bio

Marcus Rohnke is Professor of Physical Chemistry at Justus Liebig University Giessen. His scientific work focuses on the investigation of reactions and transport in materials science sample systems using secondary ion mass spectrometry. His current work centres on both biological and battery systems. He is Principal Investigator in the German Cluster of Excellence for Post Lithium Batteries (POLIS). He is author/co-author of more than 140 scientific publications.

Hydrogen Economy – A new Playground for Chemists

Summary of the lecture

In order to become climate neutral, we must reduce CO_2 emissions as much as possible. In industry, most CO_2 emissions are caused by established chemical processes. These include, for example, the setting of cement in the construction materials industry or the production of iron in blast furnaces. Chemists are therefore challenged to find and establish alternative reaction pathways that avoid the formation of CO_2. For example, iron ores can be reduced to iron using hydrogen. Hydrogen appears to be a key element in many areas here. It is also conceivable as a fuel in fuel cell cars to replace hydrocarbons. The establishment of a hydrogen economy appears to be a central element in achieving a climate-neutral society. Currently, large solar parks, electrolysers and loading terminals for tankers are being built in Saudi Arabia, for example, in order to enter the global hydrogen export market. Is this also an option for Italy?

Invited Speakers

Prof. Cristina Satriano

NanoHybrid BioInterfaces Laboratory (NHBIL), Department of Chemical Sciences, University of Catania, Catania, Italy

Short bio

Cristina Satriano (M.Sc. in Chemistry, 1997; Ph.D. in Materials Science, 2001) is Associate Professor of Physical Chemistry at the University of Catania and heads the Nano Hybrid BioInterfaces Lab. Her research focuses on multifunctional nanomaterials, biointerfaces, and theranostic systems, including plasmonic, nanoxides, and 2D hybrid nanostructures for biomedical and sustainable applications. She has authored 150+ papers, holds one patent, and has coordinated several EU and national projects.

Hybrid nanozyme composites beyond graphene for advanced catalytic and theranostic applications

Summary of the lecture

The lecture will discuss the integration of palladium (Pd) nanoparticles, graphene oxide (GO) derivatives, and magnetite (Fe_3O_4) into synergistic hybrid architectures with enhanced catalytic and biointerfacial performance. It will present the bioinspired, green fabrication of Pd@GO–Fe_3O_4 nanozymes combining catalytic, magnetic, and photonic functions in a single platform. Their roles in redox catalysis, magnetic guidance, light-driven effects, and interactions with cancer cell models will be addressed, highlighting applications in next-generation theranostics and sustainable environmental remediation.

Invited Speakers

Prof. Valentina Spampinato

Department of Chemical Sciences, University of Catania

Short bio

Valentina Spampinato is Assistant Professor of Physical Chemistry at the University of Catania, Italy. As materials scientist, she specializes in physico-chemical surface characterization using Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS). She previously worked at IMEC (Belgium), the Italian National Research Council (CNR), and the European Commission's Joint Research Centre. She holds a PhD in Materials Science and has authored over 60 peer-reviewed publications.

Sustainable device materials: from surface engineering to advanced physico-chemical characterization

Summary of the lecture

Surface engineering is a key driver in the development of sustainable device technologies, enabling enhanced material functionality and improved device performance through targeted surface modifications. Our research integrates eco-friendly surface engineering strategies to develop sustainable electronic and energy devices, including hybrid photovoltaics and electrodes for photoelectrocatalytic hydrogen production. Thin films are fabricated using controlled deposition techniques such as sputtering, spin coating, and solution-based layer-by-layer deposition, aiming to enhance efficiency while reducing environmental impact. Surface chemistry and morphology are investigated using time-of-flight secondary ion mass spectrometry (ToF-SIMS), atomic force microscopy (AFM), and X-ray photoelectron spectroscopy (XPS). This presentation will showcase selected results from ongoing projects, highlight the role of green surface engineering in next-generation devices.

Invited Speakers

Prof. Adolfo Speghini

NRG, Department of Biotechnology, University of Verona

Short bio

Adolfo Speghini is Professor of General and Inorganic Chemistry at the University of Verona, Italy. He has been a Visiting Scientist at prestigious research centers worldwide, as the Institut National de la Recherche Scientifique, Montreal, Canada and Polish Academy of Sciences, Wroclaw, Poland. Recent research focused on luminescent inorganic nanomaterials for nanomedicine. He published over 360 scientific papers on the chemistry of (nano)materials, in particular their optical spectroscopy (h-index=64, > 11,000 citations, WoS).

Nanomaterials for theranostics

Summary of the lecture

Theranostics is one of the most challenging areas of modern nanomedicine, with an increasing need for nanomaterials for diagnostics and therapy. Radiation in the optical region is of interest in this field, alongside the development of suitable nanosized light-responsive materials. Remarkably, lanthanide-doped luminescent nanomaterials are efficient optical probes in the so-called biological windows. In this lecture, the focus will be on luminescent lanthanide-activated nanosized materials for optical imaging and thermometry. Some results on fluoride-based host nanocrystals (NCs), such as KY_3F_{10}, CaF_2, and SrF_2 NCs, doped with lanthanide ions (Yb^{3+}, Er^{3+}, Tm^{3+}), will be presented. The NCs were prepared via microwave-assisted hydrothermal synthesis, using hydrophilic molecules as capping agents, enabling direct dispersion in water. The excited-state processes of the Ln^{3+} ions were investigated by analyzing the emission spectra and decays of the NCs across the UV, visible, and NIR. The thermometric performance, as the relative thermal sensitivity, was evaluated by measuring the NCs' luminescence.

Invited Speakers

Prof. Salvatore Sortino

Department of Drug and Health Sciences, University of Catania

Short bio

Full professor of chemistry at the University of Catania. His current research activity mainly focuses on the design and fabrication of light-responsive molecular and supramolecular constructs and nanomaterials for therapeutic and fluorescent imaging applications, with particular emphasis on NO photodelivery, photodynamic and photothermal therapy and their combinations. He is the author of about 240 publications in peer-reviewed journals and 3 patents (about 7500 citations, H_{index} = 44).

Publications and Patents in Scientific Research: Drafting, Peer Review and Ethical Issues.

Summary of the lecture

This lecture aims to provide the answers to the following questions:

- Publications and patents: what the main differences?
- Publishing or patenting: true or false dilemma?
- Publishing and patenting for a young researcher funded by a company: opportunity or frustration?
- When a work can be defined as scientific?
- What about the anatomy of a scientific paper?
- What about the importance of a scientific paper?
- What about the peer-review process?
- What about the ethical issues before and after publication of a scientific paper?
- What about the influence of the aphorism “publish or perish” in the quality of research?

Invited Speakers

Prof. Carmen Talotta

Department of Chemistry and Biology "A. Zambelli", University of Salerno (UNISA)

Short bio

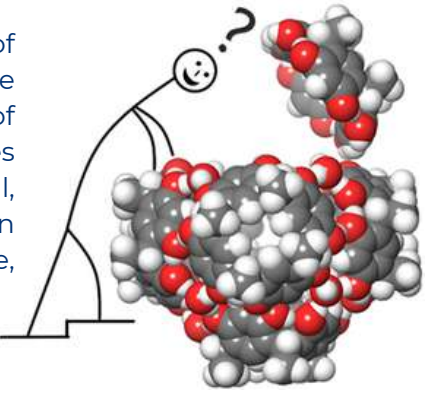
Carmen Talotta is Associate Professor of Organic Chemistry at the Department of Chemistry and Biology "A. Zambelli", University of Salerno (Italy). Her research focuses on supramolecular chemistry, with emphasis on functional macrocycles and self-assembled capsules as nanocontainers to control reactivity and selectivity. Current activities span supramolecular catalysis in hydrogen-bonded resorcinarene/pyrogallolarene capsules, host–guest recognition, mechanistic studies by NMR and computational approaches, and the design of sustainable molecular systems for synthesis and advanced materials. She is involved in several national and European research projects and actively contributes to teaching and outreach initiatives in chemistry.

Supramolecular Chemistry and Catalysis Mediated by Hexameric Capsules

Summary of the lecture

Self-assembled hydrogen-bonded capsules provide enzyme-like confined environments where weak interactions can be amplified to stabilize reactive intermediates and steer reaction pathways.[1-3] In this lecture, I will discuss recent results from our group on supramolecular catalysis inside the hexameric resorcinarene capsule (CR_6), with a focus on metal–free Friedel–Crafts acylation using acid chlorides. Bridging water molecules located at the capsule's seams act as hydrogen-bond donors that polarize the C–Cl bond,[1] while the capsule cavity simultaneously binds and stabilizes chloride through a cooperative hydrogen-bond network. This dual activation enables efficient generation and separation of tight ion pairs (chloride/dialkylammonium), opening access to reactive cationic intermediates under mild conditions.

I will also highlight how the unusually high affinity of CR6 for chloride can be leveraged as a synthetic handle beyond catalysis, enabling the formation of mechanically interlocked architectures (mechanomolecules) within the confined space. Overall, the talk will illustrate how nanoconfinement and anion recognition can be combined to develop selective, greener transformations and new molecular products.



Invited Speakers

Prof. Antonio Terrasi

Department of Physics and Astronomy, University of Catania

Short bio

Graduation in Physics in 1986 and PhD in Physics in 1990 at the University of Catania. Since 2018 full professor of experimental material science. Founder and director of the International School on “Materials for Renewable Energy and Sustainability at the“ Ettore Majorana Foundation ”in Erice (Italy).
Deputy rector for technology transfer and relationships with industries in the period 2019-2025. He has published more than 130 scientific articles in peer reviewed international journals.

Technology and Knowledge Transfer: the path of applied research

Summary of the lecture

Often, public research, even high-quality and innovative, fails to be transferred and communicated outside the lab, except through scientific articles and conferences, without triggering the increasingly necessary virtuous cycle that generates innovation and technological advancement. This presentation describes the complex and long journey from an idea and laboratory experiment to its intellectual property protection (patent), and ultimately to the potential development and commercialization of an innovative product. This process is known as knowledge and technology transfer, and represents an increasingly important (and now necessary) part of any researcher's training in all disciplines. Technology transfer models and the actions required for innovation will be described, analyzing their strengths and weaknesses.

Invited Speakers

Prof. Paola Vitale

Department of Pharmacy-Drugs Sciences - University of Bari "Aldo Moro"

Short bio

Paola Vitale is Associate Professor of Organic Chemistry at University "Aldo Moro" of Bari. Her scientific interests focused on the development of new sustainable and catalytic methodologies of APIs, heterocycles, small molecules spectroscopic characterization, also contributing to drug discovery projects. She is author of more than 100 articles, book chapters, national and international patents, as results of multidisciplinary research projects with academic and external partners, also as PI.

New synthetic methodologies for the preparation of building blocks, fine chemicals, and APIs

Summary of the lecture

This lecture will focus on new synthetic methodologies for the preparation of key compounds, fine chemicals, active ingredients (APIs), heterocycles, and small molecules.[1,2]

The growing demand for more sustainable processes has also led to the development of low-impact methodologies, useful for the synthesis of targets even at the gram scale, using bio- and metal catalysed approaches, to reduce waste and the use of substances harmful to humans and the environment.[3,4]

Among various methodologies, particular attention will be given to the synthesis of heterocycles (i.e. isoxazoles, pyrazoles, triazoles), whose structure is present in several biologically active molecules and in many drugs,[5] comparing the innovative syntheses with conventional approaches.

1.J. Med. Chem., 2013, 56, 4277-4299.
2.Advances in Heterocyclic Chemistry, (2017), 122, 1-41.
3.Org. Biomol. Chem., 2021, 19, 2558-2577.
4.Curr. Opin. Green Sustain. Chem., 2020, 21, 27-33.
5.J Med Chem. 2026, 69(3), 1842-1877.

SPRING SCHOOL
The Future is Chemistry

Directors of the School:
Prof. Giovanni Li Destri Nicosia
Prof. Graziella Malandrino
Prof. Vera Muccilli

Local Organizers:
Dr. Francesca Lo Presti
Dr. Claudia Sciacca

The Spring School, addressed to PhD students, post-docs, and master students, will provide a comprehensive overview of the most promising perspective for the Chemists of the future, as well as training in soft skills, paper writing, ethical issues and technology transfer.

Registration must be done through the following link by 20th March 2026:
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