



WORKSHOP PROGRAM

2026 IEEE INTERNATIONAL WORKSHOP ON

METROLOGY for Green technologies Renewable ENergy and ecological SusTainability

SIENA, ITALY - SEPTEMBER 23-25, 2026



**METRO
GREENST**
SIENA 2026



UNIVERSITÀ
DI SIENA 1240

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Alessandro Pozzebon, Università degli Studi di Padova, Italy

Tommaso Addabbo, Università degli Studi di Siena, Italy

IEEE MetroGREENST 2026 Keynote Speakers

Keynote Lecture - Wednesday September 23 - H 10:20



Merging Smart Sensors, IoT, AI and Digital Twins Technologies for Digital Transformation in Agriculture

Octavian Adrian Postolache

Instituto Universitário de Lisboa, Portugal

ABSTRACT

The predicted growth of the world population by more than 80 million implies that by 2050, there will be more than 9 billion people living on the Earth, where 66% of the world population will live in cities. However, the available areas for agricultural production will not be increasing due to factors such as global warming. In this context the agricultural sector needs to be able to produce more food with fewer resources. The Future of Agriculture is dependent on the digital transformation of this field of activity where technologies such as smart sensors, IoT, artificial intelligence (AI) and digital twins (DT) might be successfully applied.

Digital twin (DT) is one of the key concepts of Agriculture 4.0, being a data-driven, digital replica of a real-world object or environment. DTs show great potential to improve both efficiency and sustainability and are able to remove key constraints of human observations and interactions particularly in the farming area. Once a DT is created, it can be linked to agricultural equipment or field using smart sensors and actuators as part of an Internet of Things (IoT) Ecosystem. With this link, a DT is able to replicate the states and behavior of the physical system or environment (e.g. irrigation system, vineyard) in a digital environment. Time and spatial constraints associated with human observations can be overcome, considering observations that can be carried out in digital environment based on augmented or mixed reality technologies.

This lecture focusses on the digital transformation of Agriculture where technologies such as smart sensors and IoT provide data from in-situ and remote measurements. Data-driven models that can improve decision-making and practices helping farmers work more precisely, efficiently and sustainably are discussed and how the Digital Twins may affect the future of the agriculture. Is DT a technology that can help in decision in the context of heavy uncertainty associated with climate change. Elements of the IoT ecosystem that support the digital transformation of the agriculture will be discussed including multimodal sensing and artificial intelligence. Related to sensing as part of the IoT ecosystem in-situ sensing solutions for soil characteristics monitoring

and communication protocols strengths and drawbacks are considered. UAV and satellite imagery solutions as well as the relation between the data coming from the smart sensors distributed in the field and acquired images using multispectral imagery will be part of the presentation.

Another important aspect of precision agriculture is the development of AI models for farming operations considering data coming from different sources. Particularly, examples of smart irrigation and nutrients delivery will be part of my talk.

The application of Digital Twin in agriculture is possible due to the confluence of different technologies that assures improved monitoring, such as sensors and devices, ubiquitous connectivity and computation, and advanced modeling based on AI. Special attention is granted to AI techniques such as machine learning, deep learning and explainable artificial intelligence (XAI) and AI multi-source data-driven models supported by edge and cloud computational platforms. All of these are considered to contribute for improving crop quality and yield through the optimization of farming operations such as irrigation and nutrients delivery.

Concluding, the digital transformation in agriculture should involve all stakeholders, including farmers, researchers, developers, and policymakers, who should work together to strike a balance between technological advancements (including sensing, instrumentation and measurements latest advancements) and the ecological wellbeing, preserving our natural resources and habitat.

SPEAKER BIOGRAPHY

Dr. **Octavian Adrian Postolache** is an electrical engineer and Associate Professor with habilitation at ISCTE-Instituto Universitario de Lisboa and a Senior researcher at Instituto de Telecomunicacoes, Lisbon, Portugal. His fields of interest are smart sensors, WSN, IoT for precision agriculture, artificial intelligence for automated measurement systems, and intelligent transportation. Dr. Postolache is the author and co-author of 10 patents, 12 books, 21 book chapters, and more than 400 papers in international journals and indexed conferences with peer review. He developed important research work in the field of environmental monitoring and he participate as a PI or member in national and international Agriculture 4.0 projects such as AGROECOINN and SmartFarm 4.0 Colab. He is an IEEE Senior Member, chair of IEEE IMS TC-13, and current chair of the IEEE IMS Portugal Chapter. He is an Associate Editor of IEEE Sensors Journal, IEEE Transaction on Instrumentation and Measurement, and IoT from Elsevier. He received IEEE outstanding reviewer and the outstanding associate editor from IEEE Transactions in Instrumentation and Measurement and IEEE Sensors Journal and other awards related to his research activity at different international forums.

Keynote Lecture - Friday, September 25 - H 09:30



Sustainable Pathways for Perovskite Photovoltaics

Aldo Di Carlo

*Institute of Structure of Matter
National Research Council, Italy*

ABSTRACT

Halide perovskite solar cells have quickly become one of the most promising technologies for next-generation photovoltaics, owing to their high power conversion efficiencies and low-cost fabrication potential. Nevertheless, concerns related to environmental impact of halide composition and fabrication processes hinder their large-scale commercialization. In this talk, we propose an integrated strategy for advancing the sustainable development of halide perovskite photovoltaics by adopting eco-conscious materials and fabrication methods. The main approaches include the use of green solvents for perovskite film deposition, providing safer, more scalable, and environmentally friendly processing routes. We report the fabrication of fully flexible perovskite solar cells under ambient air conditions using low-toxicity and sustainable solvents. To further reduce solvent consumption, we also investigate solvent-free thermal evaporation as an alternative deposition technique for the perovskite layer, thereby substantially decreasing chemical waste. Furthermore, conventional noble metal electrodes are replaced with carbon-based back contacts, which offer a low-cost and sustainable alternative while maintaining suitable conductivity and stability. This approach also highlights the potential compatibility of these devices with full roll-to-roll manufacturing. Finally, we tackle the issue of lead toxicity by partially replacing lead with tin in mixed Pb-Sn perovskite compositions, reducing environmental concerns while preserving promising photovoltaic performance in both single-junction devices and perovskite/perovskite tandem solar cells. Overall, these developments represent important steps toward the realization of greener, safer, and more sustainable perovskite solar technologies for future large-scale deployment.

SPEAKER BIOGRAPHY

Aldo Di Carlo is a Full Professor at the Department of Electronic Engineering at the University of Rome Tor Vergata (Italy), Director of the Institute of Structure of Matter of the National Research Council of Italy (CNR-ISM), and President of the CNR Research Area of Rome – RM2, which includes more than 10 research institutes. Di Carlo founded and directed from 2006 to 2019, the Center for Hybrid and Organic Solar Energy (CHOSE), which comprises more than 70 PhD students and experienced researchers in the emerging field of photovoltaics. Additionally, he served as Chairman of the Scientific Council of the Dyepower consortium for the development and industrialization of Dye Solar Cells (DSCs). Di Carlo's research interests include the study, design, and optimization of electronic and optoelectronic devices. His work has focused on the development and scaling-up of emerging photovoltaic technologies, with particular emphasis on Dye Solar Cells (DSCs) and Perovskite Solar Cells for industrial applications. He has authored or co-authored over 600 international scientific publications and holds 13 international patents. Furthermore, he has served as general coordinator or partner coordinator in more than 30 large European projects.

IEEE MetroGREENST 2026 Tutorial

Tutorial - Thursday, September 24 - H 12:00



Measuring Photovoltaic Reliability: From Lab Tests to Field Diagnostics

Nicola Trivellin

University of Padova, Italy

ABSTRACT

Photovoltaic systems are expected to operate for decades while maintaining high energy yield and electrical safety. Their environmental benefit and economic viability therefore depend not only on initial conversion efficiency, but also on the ability to quantify degradation, detect incipient failures, and distinguish actual defects from variations caused by irradiance, temperature, and operating conditions. Nevertheless, the translation of laboratory measurements into reliable assessments of field performance remains challenging because of interacting environmental stressors, heterogeneous degradation mechanisms, and measurement uncertainty.

This tutorial presents a measurement-oriented framework for assessing the reliability of photovoltaic cells and modules, from controlled accelerated tests to in-field diagnostics. Starting from the distinction between gradual performance degradation and discrete failure events, the main degradation mechanisms—including light-induced degradation, potential-induced degradation, reverse-bias hot spots, and climatic or mechanical damage—are connected to their measurable electrical, optical, and thermal signatures.

Laboratory approaches based on damp-heat exposure, thermal cycling, irradiation, high-voltage stress, and reverse-bias testing are discussed, with particular attention to test conditions, baseline and post-stress characterization, and the limitations of extrapolating accelerated-test results to service lifetime. Electrical characterization through light and dark current-voltage measurements is complemented by electroluminescence, photoluminescence, ultraviolet fluorescence, and infrared thermography. For each technique, the tutorial examines the measurement setup, relevant influence quantities, spatial resolution, sensitivity, repeatability, and possible sources of misinterpretation.

Finally, field inspections and UAV-based RGB and infrared imaging are presented through practical case studies involving cell cracks, hot spots, disconnected substrings, junction-box failures, potential-induced degradation, and hail damage. The complementarity of multiple techniques is highlighted as the basis for increasing diagnostic confidence and supporting condition-based maintenance. Overall, the tutorial demonstrates how traceable and correctly interpreted measurements can contribute to lifetime extension, reduced maintenance costs, lower material consumption, and more sustainable photovoltaic energy production.

SPEAKER BIOGRAPHY

Nicola Trivellin is an Associate Professor of Electronics at the Department of Industrial Engineering, University of Padova, Italy. His research focuses on the characterization, reliability, and failure analysis of photovoltaic cells and modules and optoelectronic semiconductor devices. His activities include electrical, optical, and thermal measurement techniques, accelerated stress testing, environmental degradation, and laboratory and field diagnostics. His research interests also encompass flexible and emerging photovoltaic technologies, solid-state lighting, visible light communication, energy harvesting, and energy-efficient embedded measurement systems. He is an Associate Editor of the IEEE Journal of Photovoltaics and a member of the IEEE Instrumentation and Measurement Society, IEEE Reliability Society, IEEE Electron Devices Society, and SPIE. He has authored or co-authored more than 200 scientific publications and is an inventor or co-inventor of nine national and international patent applications. He has coordinated research activities within several national and European projects, including PNRR NEST – Network 4 Energy Sustainable Transition, PNRR SERICS, HEIMAT, and AI-Twilight. He is also a co-founder of the LightCube university spin-off and has coordinated applied research activities with industrial partners including Artemide, Infineon Technologies, and Applied Materials. His recognitions include Best Paper Awards at the IEEE Sustainable Smart Lighting World Conference 2023, IEEE MetroSea 2021, and ESREF 2009.

IEEE MetroGREENST 2026 Venue



IEEE MetroGREENST 2026 will be held at the University of Siena in San Niccolò building.

The San Niccolò building is the ex-Psychiatric Hospital of Siena. It was not only a hospital, but a little village dedicated to hosting psychiatric patients, including food production and other facilities for their life and support.

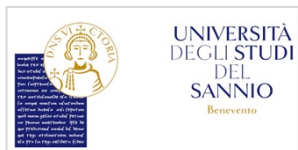
The building has been reconverted to host a few departments of the University of Siena in 2006: the Department of Information Engineering and Mathematical Science, the Department of ancient and modern Literatures, the Department of Communication and Political Sciences.

ADDRESS

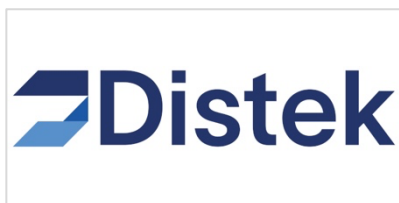
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Technical Program - Wednesday, September 23

09:30 - 17:00	University of Siena - San Niccolò building
REGISTRATIONS	

10:00 - 10:20	Room 101
OPENING CEREMONY - WELCOME ADDRESSES	

INSTITUTIONAL GREETINGS

Prof. Valerio **Vignoli**, *DIISM - University of Siena, Italy*

Prof. Nicola **Donato**, *University of Messina, Italy* - IEEE MetroGREENST Honorary Chair

Prof. Ada **Fort**, *University of Siena, Italy* - IEEE MetroGREENST General Chair

Prof. Mara **Bruzzi**, *National Research Council, Italy* - IEEE MetroGREENST General Chair

Prof. Ramaswamy **Nagarajan**, *University of Massachusetts Lowell, USA* - IEEE MetroGREENST General Chair

10:20 - 11:00	Room 101
KEYNOTE LECTURE	
Chair: Nicola Donato, <i>University of Messina, Italy</i>	

Merging Smart Sensors, IoT, AI and Digital Twins Technologies for Digital Transformation in Agriculture

Octavian Adrian Postolache, *Instituto Universitário de Lisboa, Portugal*

11:00 - 11:20	University of Siena - San Niccolò building
COFFEE BREAK	

11:20 - 12:05 Room 101

S1 - From light to green: the future of optical fibre sensors

Chairs: Francesco Baldini, *National Research Council, Italy*

Cosimo Trono, *National Research Council, Italy*

11:20 AI-Assisted Sparse Fiber-Optic Temperature Field Reconstruction for Food Tray Heating Uniformity Assessment

Xuan Wu, Xingwei Wang, Guoqiang Cui (University of Massachusetts Lowell, USA); Mariya K Stephenson and Shannon K McGraw-Manza (DEVCOM Soldier Center, USA); Marietta Arakelian (University of Massachusetts Lowell, USA)

11:35 Hybrid Optical-Electrochemical Fiber Sensing for Sustainable Monitoring and Green Applications

Cosimo Trono and Niccolò Marcucci (Istituto di Fisica Applicata Nello Carrara, CNR, Italy); Francesco Arcadio (University of Campania Luigi Vanvitelli, Italy); Giuseppe Lamberti and Laura Martina (University of Salento, Italy); Danilo Greco (University of Catania, Italy); Mostafa Fytory (Istituto di Fisica Applicata Nello Carrara, CNR, Italy); Maria Rachele Guascito (University of Salento, Italy); Nunzio Cennamo (University of Campania Luigi Vanvitelli, Italy); Bruno Ando (University of Catania, Italy); Sara Tombelli and Francesco Baldini (Istituto di Fisica Applicata Nello Carrara, CNR, Italy); Luigi Zeni (University of Campania Luigi Vanvitelli, Italy); Laura Pasquardini (Indivenire Srl, Italy)

11:50 Towards a Hybrid Bioresorbable Optical Fiber for Fluorescence-Based Monitoring of Chemotherapeutic Drugs

Niccolò Marcucci, Andrea Donati, Daniele Farnesi, Ambra Giannetti, Cosimo Trono, Francesco Baldini and Simone Berneschi (Istituto di Fisica Applicata Nello Carrara, CNR, Italy)

12:10 - 13:10 Room 101

S2 - Materials, Technologies, and Design Strategies for Green Sensing Solutions

Chairs: Giovanni Gugliandolo, *University of Messina, Italy*

Laura Arruzzoli, *University of Messina, Italy*

12:10 Printed TiO₂ Nanostructured Films: A Resource Efficient Approach for Chemoresistive Ethanol Sensors

Mariangela Latino (IPCF CNR, Italy); Federico Randazzo, Laura Arruzzoli and Giovanni Gugliandolo (University of Messina, Italy); Donatella Spadaro and Giuseppe Calogero (IPCF CNR, Italy); Alessandro Pistone and Nicola Donato (University of Messina, Italy)

12:25 Design and Thermal Characterization of a Flexible Printed Transducer for Gas Sensing Applications

Giovanni Gugliandolo, Laura Arruzzoli, Federico Randazzo and Antonino Quattrocchi (University of Messina, Italy); Pier Paolo Capra (Istituto Nazionale di Ricerca Metrologica, Italy); Nicola Donato (University of Messina, Italy)

12:40 Contactless Monitoring of Drying Patterns in Lime-Based Materials Using an Inkjet-Printed Coupled Split Ring Resonator

Laura Arruzzoli, Alessio Altadonna, Giovanni Gugliandolo, Antonino Quattrocchi, Giovanni Crupi, Fabio Todesco and Nicola Donato (University of Messina, Italy)

12:55 Optical Quality Assessment of Flexible Resistive Sensors Manufactured by Direct Ink Writing

Antonino Quattrocchi (University of Messina, Italy); Giorgia Fiori (Roma Tre University, Italy); Giovanni Gugliandolo (University of Messina, Italy); Mariangela Latino (IPCF CNR, Italy); Andrea Scorza and Salvatore Andrea Sciuto (University of ROMA TRE, Italy); Nicola Donato (University of Messina, Italy)

13:10 - 14:00 University of Siena - San Niccolò building
LUNCH

14:00 - 15:00 Room 101
S3 - Nuclear Physics and Environmental Sustainability - PART I
Chairs: Silvia Nava, *University of Florence & INFN, Italy*
 Fabio Giardi, *National Institute of Nuclear Physics, Italy*

14:00 A Multi-Site and Multi-Time Positive Matrix Factorisation Approach to Investigate Atmospheric Aerosol Sources

Laura Cadeo, Vera Bernardoni, Federica Crova, Gianluigi Valli (Università degli Studi di Milano, Italy); Giulia Calzolari (National Institute of Nuclear Physics, Italy); Silvia Nava and Franco Lucarelli (University of Florence, Italy); Fabio Giardi (National Institute of Nuclear Physics, Italy); Dario Massabò, Federico Mazzei and Paolo Prati (University of Genoa, Italy); Matteo Rinaldi and Marco Paglione (National Research Council, Italy); Roberta Vecchi (Università degli Studi di Milano, Italy)

14:15 PIXE Technique for Source Apportionment of Arctic Aerosol and Its Advantages in Tracing Mineral Dust Contribution

Fabio Giardi (National Institute of Nuclear Physics, Italy); Silvia Nava and Franco Lucarelli (University of Florence, Italy); Giulia Calzolari and Massimo Chiari (National Institute of Nuclear Physics, Italy); Filippo Lucherini (University of Florence, Italy)

14:30 A Student-Made Map of Natural Radioactivity: Experiential Learning with a Portable Gamma-Ray Detector at the INFN National Laboratory of Frascati

Ghulam Hasnain, Mohamed Abdelkader, Matteo Albéri, Nedime Irem Elek, Engin Can Esen and Fabio Mantovani (University of Ferrara, Italy); Cristina Mattone (CAEN S.p.A., Italy); Kassandra Giulia Cristina Raptis and Virginia Strati (University of Ferrara, Italy)

14:45 From Point to Field Scale: Comparing Gamma Ray and FDR Soil Moisture Sensing in Precision Viticulture

Nedime Irem Elek, Mohamed Abdelkader, Matteo Albéri, Engin Can Esen and Ghulam Hasnain (University of Ferrara, Italy); Antonio Manes (University of Florence, Italy); Fabio Mantovani, Kassandra Giulia Cristina Raptis and Virginia Strati (University of Ferrara, Italy)

15:05 - 16:05 Room 101

S4 - Nuclear Physics and Environmental Sustainability - PART II

Chairs: Silvia Nava, *University of Florence & INFN, Italy*
 Fabio Giardi, *National Institute of Nuclear Physics, Italy*

15:05 Ion Beam Analysis for Metrology-Guided Optimization of Magnetron-Sputtered CsPbBr₃ Thin Films

Lucia Baldesi and Mara Bruzzi (University of Florence, Italy); Massimo Chiari (INFN Sezione di Firenze, Italy); Leonardo Forcieri and Anna Vinattieri (University of Florence, Italy)

15:20 PIXE Analysis of Atmospheric Aerosols at LABEC

Filippo Lucherini (University of Florence, Italy); Fabio Giardi and Massimo Chiari (National Institute of Nuclear Physics, Italy); Silvia Nava (University of Firenze, Italy)

15:35 EyeRAD: Development of an INFN Environmental Radioactivity Monitoring Network for Atmospheric Radionuclide Surveillance and Emergency

Flavia Groppi (University of Milan, Italy); Monica Sisti (Università di Milano Bicocca, Italy)

15:50 Muon Radiography as a Non-Invasive Metrological Tool for Sustainable Characterization of Natural and Built Environments

Lorenzo Bonechi (INFN Firenze); Tommaso Beni (University of Florence, Italy); Diletta Borselli, Roberto Ciaranfi and Catalin Frosin (INFN Firenze, Italy); Sandro Gonzi and Vitaliano Ciulli (University of Florence, Italy); Raffaello Dalessandro (INFN Firenze, Italy)

16:05 - 16:30 University of Siena - San Niccolò building

COFFEE BREAK

16:30 - 17:45 Room 101

S5 - Sensing systems for sustainable electronics

Chairs: Mattia Scagliotti, *National Research Council, Italy*
 Carlo Trigona, *University of Catania, Italy*

- 16:30 Organic Thin-Film Transistors on Bacterial Cellulose for Sustainable Electronics**
Mattia Scagliotti, Matteo Rapisarda, Luigi Mariucci, Francesca Pescosolido and Antonio Valletta (CNR-IMM, Italy)
- 16:45 A Wirelessly Powered Multi-Sensor Platform Integrating AlN MEMS and Bacterial Cellulose Sensors for Autonomous Vibration Monitoring**
 Suhail Ahmed, Sa, Carlo Trigona, Salvatore Graziani, Bruno Ando, Sara Sadat Hosseini, Danilo Greco, Mattia Manenti, Salvatore Baglio, Antonino Pollicino and Giovanna Di Pasquale (University of Catania, Italy)
- 17:00 Organic Photovoltaics Based on PM6: Y8 with Copper Iodide as Hole Transport Layer for Improved Ambient Stability and Efficiency**
 Punit Sharma, Jayant Kumar and Ramaswamy Nagarajan (University of Massachusetts Lowell, USA); Ravi Mosurakal (US Devcom Soldier Center, USA)
- 17:15 Integrated Characterization and Performance Assessment of NiCo and NiCoFe Alloys for Oxygen Evolution in Alkaline Media**
Raoul Cosenza, Maddalena Corsini and Andrea Atrei (University of Siena, Italy)
- 17:30 Investigation of FexOy-Based Chemoresistive Gas Sensors for Hydrogen Leak Detection in Industrial Environments**
Gianluca Caposciutti (University of Pisa, Italy); Elia Landi, Ada Fort and Enza Panzardi (University of Siena, Italy); Bernardo Tellini (University of Pisa, Italy)

19:00 Palazzo Sansedoni - Via Banchi di Sotto,34 - Siena
WELCOME PARTY

The Welcome Party will take place in the magnificent frescoed halls of the Monte dei Paschi di Siena Foundation, located within the historic Palazzo Sansedoni. This remarkable 13th-century palace, distinguished by its elegant Gothic trifora windows overlooking the iconic Piazza del Campo, offers a unique setting where history, art, and culture come together. Participants will have the opportunity to enjoy an unforgettable evening in one of Siena's most prestigious and evocative landmarks.

Technical Program - Thursday, September 24

09:00 - 17:00 *University of Siena - San Niccolò building*

REGISTRATIONS

09:30 - 10:30 *Room 101*

S6 - Advanced (Bio)Sensing Systems for the One Health Ecosystem - PART I

Chairs: Sebania Libertino, *National Research Council, Italy*

Fabio Matera, *National Research Council, Italy*

09:30 A Hybrid Bio-Optoelectronic System: From Heavy Metal Detection in Water to Real-Time Bacterial Metabolic Profiling

Domenico Corso (University of Pavia & CNR-IMM, Italy); Giuseppe A. Screpis (University of Messina & National Research Council, Italy); Serena C. R. Reina (University of Catania, Italy); Roberta Farina and Fabio Matera (CNR-IMM, Italy); Salvatore Pennisi (University of Catania & CNR-IMM, Italy); Maria Anna Coniglio (University of Catania, Italy); Sebania Libertino (CNR-IMM, Italy)

09:45 Electropolymerized Polyaniline Decorated with Gold Nanoparticles on Carbon Screen-Printed Electrode for Ammonium Ion Detection in Water

Roberta Farina and Silvia Scalese (CNR-IMM, Italy); Domenico Corso (University of Pavia & CNR-IMM, Italy); Giuseppe A. Screpis (University of Messina & National Research Council, Italy); Serena C. R. Reina (University of Catania, Italy); Fabio Matera (CNR-IMM, Italy); Maria Anna Coniglio (University of Catania, Italy); Sebania Libertino (CNR-IMM, Italy)

10:00 Understanding ATP Dynamics Across Species and Stress: Optimizing Chemiluminescence-Based Bacterial Detection

Giuseppe A. Screpis (University of Messina & National Research Council, Italy); Roberta Farina (CNR-IMM, Italy); Domenico Corso (University of Pavia & CNR-IMM, Italy); Serena C. R. Reina (University of Catania, Italy); Fabio Matera (CNR-IMM, Italy); Maria Anna Coniglio (University of Catania, Italy); Maria Rosaria Plutino (National Council of Research, Italy); Beatrice Fermi (Sanipur S.p.A, Italy); Sebania Libertino (CNR-IMM, Italy)

10:15 Labelling of Escherichia Coli Comparing Ruthenium-tris(2,2'-Bipyridyl) Dichloride and FITC

Serena C. R. Reina (University of Catania, Italy); Roberta Farina (CNR-IMM, Italy); Giuseppe A. Screpis (University of Messina & National Research Council, Italy); Domenico Corso (University of Pavia & CNR-IMM, Italy); Maria Antonietta Buccheri (CNR-IMM, Italy & University of Catania, Italy); Sebania Libertino (CNR-IMM, Italy); Maria Anna Coniglio (University of Catania, Italy)

10:30 - 11:00 *University of Siena - San Niccolò building*

COFFEE BREAK - POSTER SESSION

Chairs: Irene Cappelli, *University of Siena, Italy*

Alessandro Pozzebon, *University of Padova, Italy*

- PS01 Laboratory Evaluation of Combined Capacitive and Impedance Spectroscopic Sensing for Ice Detection and Thickness Measurement**
Thomas Schwar, Markus Neumayer, Franziska Holzmann, Thomas Bretterklieber and Hannes Wegleiter (Graz University of Technology, Austria)
- PS02 Embedded OFDR Distributed Fiber Sensing for Real-Time Load Distribution Measurement in Wearable Systems**
 Marietta Arakelian, Xingwei Wang, Xuan Wu (University of Massachusetts Lowell, USA)
- PS03 Label-Free Detection of Perfluorooctanoic Acid Using Synergistic Nanocoated Optical Fiber Sensor and Engineered Bioreceptor**
 Giulia Moro (Ca' Foscari University of Venice, Italy); Pablo Zubiarte and Ignacio Del Villar (Public University of Navarre, Spain); Ambra Giannetti (Istituto di Fisica Applicata Nello Carrara, Italy); Karolien De Wael (University of Antwerp, Belgium); Francesco Chiavaioli (Istituto di Fisica Applicata Nello Carrara, Italy)
- PS04 Long-Term Field Evaluation of a Low-Power Wireless Sensor Network for Vineyard Environmental Monitoring**
Irene Cappelli, Marco Tani, Valerio Vignoli and Ada Fort (University of Siena, Italy)
- PS05 A Distributed Measurement System for Hydrogen Leak Detection in Industrial Scenarios**
 Elia Landi, Ada Fort, Enza Panzardi, Marco Mugnaini, David Baldo and Valerio Vignoli (University of Siena, Italy)
- PS06 A Smartphone-Assisted BLE Measurement Architecture for Sustainable Active Mobility Monitoring Platforms**
 Enza Panzardi, Marco Tani, Elia Landi, Ada Fort, Federico Carli, Federico Micheletti, Marco Mugnaini, Irene Cappelli, Stefano Parrino and Valerio Vignoli (University of Siena, Italy)
- PS07 Experimental Investigation of the Hydrogen Response of a Commercial BME688 MOX Sensor**
Enza Panzardi and Ada Fort (University of Siena, Italy); Gregorio Andria (Politecnico di Bari, Italy); Elia Landi, Tommaso Addabbo, Marco Mugnaini and Valerio Vignoli (University of Siena, Italy)
- PS08 High-Value Resistance Measurements as a Sensitive Tool for the Characterization of PLA Composites with Char from End-of-Life Tyres**
Pier Paolo Capra and Andrea Sosso (INRiM - Istituto Nazionale di Ricerca Metrologica, Italy); Mattia Di Maro (STEMS-CNR, Italy); Giuliana Magnacca (University of Torino,

Italy); Maria Giulia Faga (STEMS-CNR, Italy); Giulio Malucelli (Politenico di Torino, Italy); Donatella Duraccio (CNR, Italy)

PS09 PDCC: A Dataset for Discovering Polymer Adsorbents for Pharmaceutical Removal from Water

Duccio Meconcelli (University of Florence, Italy); Sara Bacconi, Fiamma Romagnoli, Niccolò Pancino, Samuele Maggiori, Franco Scarselli and Monica Bianchini (University of Siena, Italy)

PS10 Integrating Multi-Analytical Approaches for Geographical Identification of Wine-Making Sangiovese Grapes

Raffaello Nardin, Michele Baglioni, Camilla Baldanzi, Claudio Rossi, Gabriella Tamasi, Marco Consumi and Tommaso Betti (University of Siena, Italy)

PS11 A Portable Spatially Resolved CW-NIRS Based on Silicon Photomultiplier for Low-Resource Setting

Roberto Pagano and Nino Marino (CNR-IMM, Italy); Shahbaz Askari (University of British Columbia, Canada); Christian L. Petersen (Sensawave Technology Inc., Canada); Guy Dumont (University of British Columbia, Canada); Salvatore Lombardo (CNR-IMM, Italy)

PS12 A Component-Level Measurement System for Energy Consumption Analysis in Material Extrusion Additive Manufacturing

Giorgio de Alteriis, Harsh Jaydev Divecha, Ida Papallo, Giovanni Rianna, Alessandro Scognamiglio, Rosario Schiano Lo Moriello and Annalisa Liccardo (University of Naples Federico II, Italy); Alessia Teresa Silvestri (Universitas Mercatorum, Italy)

PS13 Exploiting Conformable Thermoelectric Transducers for Autonomous Sensor Nodes

Carlo Trigona, Mohamd Amine Karoui, Giuliano A. Salerno, Michele Bonaccorsi, Giuseppe Politi and Anna M Gueli (University of Catania, Italy)

PS14 Unidirectional Wearable Diffractive Optical Based Large Strain Sensing for Soft and Wearable Robotics

Opeyemi Akanbi, Shankar Acharya and Yingjie Zhang (University of Massachusetts Lowell, USA); Edward Zhang (Emory University, USA); Shuman Xia (Georgia Institute of Technology, USA); Wei Guo (University of Massachusetts Lowell, USA)

11:00 - 12:00 Room 101

S7 - Advanced (Bio)Sensing Systems for the One Health Ecosystem - PART II

Chairs: Sebania Libertino, *National Research Council, Italy*
 Fabio Matera, *National Research Council, Italy*

11:00 Screen-Printed Fabric Electrode for Long-Term ECG Monitoring

Kedar Bagewadi, Lasya Maganti and Jayant Kumar (University of Massachusetts Lowell, USA); Paola D'Angelo (US Army DEVCOM Soldier Center, Natick, MA, USA); Kristine Isherwood (US Army DEVCOM Soldier Center, USA); Ramaswamy Nagarajan and Siddhant Iyer (University of Massachusetts Lowell, USA)

- 11:15 Tailoring the Degradation of Biodegradable Polymer Composites Through Natural Fibres and Catalytic Fillers**
 Libera Vitiello (National Research Council, Italy); Giuseppe Proietto Salanitri (University of Bologna, Italy); Andrea Antonino Scamporrino, Chiara LaFerrera and Giuliana Impellizzeri (National Research Council, Italy); Lucia Gioiella and Giovanni Filippone (University of Naples Federico II, Italy); Sabrina C Carroccio (National Research Council, Italy)
- 11:30 Electrochemical Hydrogen Compression as Enabler for the One-Health Ecosystem**
Fabio Matera, Roberta Farina (CNR-IMM, Italy); Domenico Corso (University of Pavia & CNR-IMM, Italy); Giuseppe A. Screpis (University of Messina & National Research Council, Italy); Serena C. R. Reina (University of Catania, Italy); Polett Mayra Gurrola (Tecnológico Nacional de Mexico, Mexico); Maria Anna Coniglio (University of Catania, Italy); Sebania Libertino (CNR-IMM, Italy)
- 11:45 Proof-of-Concept Custom-Designed Compact Spectroscopic Device for Hg(II) Monitoring in Water Through Porphyrin/Polymer Strip**
Cristiana Longo and Ivana Di Bari (CNR-IMM); Valerio Scimone (Centro Siciliano di Fisica Nucleare e Struttura della Materia, Italy); Giusy Curcuruto (National Research Council); Sabrina C Carroccio (CNR - IPCB, Italy); Emanuela T.A. Spina (National Research Council, Italy); Domenico Longo (University of Catania, Italy); Giuseppe A.M. D'Arrigo (National Research Council, Italy); Alessia Rita Tricomi (University of Catania, Italy); Antonella Sciuto (National Research Council, Italy)

12:00 - 12:40	Room 101 TUTORIAL Chair: Enza Panzardi, <i>University of Siena, Italy</i>
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Measuring Photovoltaic Reliability: From Lab Tests to Field Diagnostics

Nicola Trivellin, *University of Padova, Italy*

12:40 - 14:00	University of Siena - San Niccolò building LUNCH
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14:00 - 15:15	Room 101 S8 - Sustainability of Measurement Systems: Methods, Instruments, and Lifecycles in Industrial, Health, and Agricultural Monitoring - PART I Chairs: Susanna Spinsante, <i>Università Politecnica delle Marche, Italy</i> Alessandro Pozzebon, <i>University of Padova, Italy</i>
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- 14:00 Unresolved Multi-Component Target Vibration Effects on Radar Displacement Measurements for Industrial Quality Inspection**
Gianluca Ciattaglia, Michela Raimondi, Antonio Nocera, Ennio Gambi and Susanna Spinsante (Università Politecnica Delle Marche, Italy)
- 14:15 Characterization of Energy Consumption of a Wolf Deterrent System for off-Grid Applications**
Leonardo Martin, Giacomo Peruzzi, Matteo Bertocco, Nicola Trivellin and Alessandro Pozzebbon (University of Padova, Italy)
- 14:30 Simulation-Driven Hydrogen Leak Detection and Localization in Confined Enclosures**
Paolo Andreini, David Baldo, Ada Fort, Elia Landi, Marco Mugnaini and Monica Bianchini (University of Siena, Italy)
- 14:45 A Distributed Power Measurement System for a Sustainable University Building**
Alessandro Terenzi, Gianluca Ciattaglia, Valeria Bruschi, Adelmo De Santis, Stefania Cecchi, Susanna Spinsante (Università Politecnica Delle Marche, Italy)
- 15:00 A Measurement-Driven Framework for the Preliminary Assessment of Renewable-Powered Modular Data Centers**
Francesco Bonavolontà, Annalisa Liccardo, Egidia Cirillo, Maria Teresa Verde (University of Naples Federico II, Italy); Giuliano Cacciapuoti and Francesco Frangipane (Luminis Srl, Italy)

15:20 - 16:20 Room 101
S9 - Sustainability of Measurement Systems: Methods, Instruments, and Lifecycles in Industrial, Health, and Agricultural Monitoring - PART II
Chairs: Susanna Spinsante, *Università Politecnica delle Marche, Italy*
Gianluca Ciattaglia, *Università Politecnica delle Marche, Italy*

- 15:20 Measuring Low Frequency Currents in the Transformer Neutral Point Using a Shunt-Based Approach**
Anja K Elsässer, Markus Neumayer, Bernhard Schweighofer and Thomas Bretterklierer (Graz University of Technology, Austria); Philipp Schachinger and Fredi Belavić (Austrian Power Grid (AG), Austria); Hannes Wegleiter (Graz University of Technology, Austria)
- 15:35 High-Temperature Excitation-Only LVDT Position Sensor Toward Sustainable Steel Production**
Gabriel Gruber and Hannes Wegleiter (Graz University of Technology, Austria)
- 15:50 An Accurate Open-Source Based Reactor Model for Small-Scale Wood Combustion**
Shumaila Mushtaq (University of Perugia, Italy); Tommaso Scorteccia and Lidia Paliani (Tiemme Elettronica Srl, Italy); Giorgio Baldinelli and Antonio Moschitta (University of Perugia, Italy)

- 16:05 A Critical Assessment of Type a- and Type B-Based Indicators for Wind Turbine Performance Monitoring via Power-Curve Analysis**
Davide Astolfi (University of Brescia, Italy); Alessandro Canali, Francesco Castellani (University of Perugia, Italy); Alessandro Depari, Paolo Ferrari, Alessandra Flammini, Marco Pasetti and Emiliano Sisinni (University of Brescia, Italy); Ludovico Terzi (ENGIE Italia, Italy)

16:20 - 16:45 *University of Siena - San Niccolò building*
COFFEE BREAK - POSTER SESSION
Chairs: Irene Cappelli, *University of Siena, Italy*
 Alessandro Pozzebon, *University of Padova, Italy*

The posters presented in this session are the same as those featured during the morning poster session (10:30–11:00).

16:45 - 18:00 *Room 101*
S10 - Metrology, Sensing, and Data-Driven Analysis in Electric Micro and Light mobility
Chairs: Michelangelo-Santo Gulino, *University of Florence, Italy*
 Elia Landi, *University of Siena, Italy*

- 16:45 From Irradiance to Solar Kilometres: A Metrological Assessment of Vehicle-Integrated Photovoltaics for Light Quadricycles**
Maurizio Laschi, Michelangelo Santo Gulino, Dario Vangi and Mara Bruzzi (University of Florence, Italy)
- 17:00 A Laboratory and on-Board Characterization Framework for Perovskite Solar Modules in Light-Electric Vehicles**
Mara Bruzzi, Maurizio Laschi, Michelangelo Santo Gulino and Dario Vangi (University of Florence, Italy)
- 17:15 Implementation of Sensor Fusion and Control Logic for Multi-Mode Operation of an Innovative Self-Balancing Microvehicle**
 Marco Fabbri, Maurizio Laschi, Michelangelo Santo Gulino and Dario Vangi (University of Florence, Italy)
- 17:30 Last-Mile Delivery Cargo e-Bikes as Innovative Data Acquisition Platforms for Road Infrastructure Assessment and Cyclist Safety Improvement**
 Cosimo Lucci (University of Florence, Italy); Jessica Leoni (Politecnico di Milano, Italy); Andrea Raimondi and Valentino Crociani (University of Florence, Italy); Mara Tanelli (Politecnico di Milano, Italy); Niccolò Baldanzini and Giovanni Savino (University of Florence, Italy)
- 17:45 Dynamic Physico-Chemical Modeling of BME688 Response to Isobutylene for Low-Cost Environmental Monitoring Systems**
Anna Lo Grasso (University of Udine, Italy); Enza Panzardi, Marco Mugnaini, Valerio Vignoli and Ada Fort (University of Siena, Italy)

20:00

Accademia dei Rozzi - Sala della Suvera - Via di Beccheria, 14 - Siena
GALA DINNER

The Gala Dinner will be held in the prestigious **Sala della Suvera**, one of the historic halls of the **Accademia dei Rozzi** in Siena. This elegant circular room, named after the academy's emblem- the cork oak tree ("suvera") - is regularly used for cultural events, presentations, and official civic ceremonies. Located at Via di Beccheria 14, the venue provides a refined and authentic Siennese atmosphere for an enjoyable evening of networking and conviviality.

Technical Program - Friday, September 25

09:00 - 12:00 *University of Siena - San Niccolò building*
REGISTRATIONS

09:30 - 10:10 *Room 101*
KEYNOTE LECTURE
Chairs: Mara Bruzzi, *National Research Council, Italy*
Annalisa Liccardo, *University of Naples Federico II, Italy*

Sustainable Pathways for Perovskite Photovoltaics

Aldo Di Carlo, *Institute of Structure of Matter, National Research Council, Italy*

10:10 - 10:40 *University of Siena - San Niccolò building*
COFFEE BREAK

10:40 - 11:40 *Room 101*
S11 - Food Traceability: Geographical Origin, Quality, Sustainability and Varietal Assessment
Chairs: Gabriella Tamasi, *University of Siena, Italy*
Irene Cappelli, *University of Siena, Italy*

10:40 A Low-Cost Colorimetric Method for Total Organic Carbon Monitoring in Aquatic Environments
Amedeo Boldrini and Duccio Tatini (University of Siena, Italy); Riccardo Gaetano Cirrone (University of Palermo, Italy); Luisa Galgani (University of Siena, Italy); Xinyu Liu (Consorzio Interuniversitario per lo Sviluppo dei Sistemi a Grande Interfase, Italy); Steven Arthur Loiselle (University of Siena, Italy)

10:55 Optimised SSR-Based Methodology for Genetic Traceability and Varietal Characterisation of Olive Cultivars Within the PNRR Agritech Framework
Tommaso Betti, Veronica Conti and Sara Parri (University of Siena, Italy); Chiara Piccini (CNR, Italy); Giampiero Cai, Marco Romi and Andrea Bellini (University of Siena, Italy)

11:10 Excitation-Emission Matrix Fluorescence Combined with PARAFAC and Machine Learning for the Geographical Discrimination of Monovarietal Olive Oils
Duccio Tatini, Alessandro Donati, Claudio Rossi, Ginevra Vigni, Claudia Bonechi and Gabriella Tamasi (University of Siena, Italy)

- 11:25 Hyperspectral Imaging for the Characterization of Dry-Cured Hams According to Curing Time**
 Giuseppe Bonifazi, Giuseppe Capobianco, Paola Cucuzza, Riccardo Gasbarrone, Roberta Palmieri, Silvia Serranti (Sapienza - University of Rome, Italy)

11:45 - 13:00 Room 101

S12 - Sensors, Biosensors and Systems for Plant Monitoring

Chairs: Domenico Caputo, *Sapienza University of Rome, Italy*

Francesco Chiavaioli, *National Research Council, Italy*

- 11:45 Passivated Interdigitated Electrode Sensor for Aqueous Spray Deposition Monitoring**
Matteo Del Vecchio, Irene Cappelli, Enza Panzardi, Marco Mugnaini and Ada Fort (University of Siena, Italy)

- 12:00 Design of an Integrated Electrochemical Sensor for Multiplexed Detection Ions in Plants**
Domenico Caputo, Fabio Cappelli, Giulia Petrucci and Nicola Lovecchio (Sapienza University of Rome, Italy); Daniela De Venuto and Michele Chiarantoni (Politecnico di Bari, Italy); Francesca Costantini (CREA, Italy); Gabriele Favero, Greta Peruzzi, Alessandro Ciccola and Massimo Reverberi (Sapienza University of Rome, Italy)

- 12:15 Solar-Powered IoT Infrastructure for Bird-Pest Identification in Rice Paddies**
 Moustapha Thiam (Université Cheikh Anta Diop de Dakar, Senegal); Salvatore Dello Iacono and Davide Astolfi (University of Brescia, Italy); Madiop Diouf (Université du Sine Saloum El-hâdj Ibrahima Niass de Kaolack, Senegal); Ibra Dioum (Ecole Supérieure Polytechnique - Université Cheikh Anta Diop, Senegal); Paolo Ferrari, Alessandra Flammini, Emiliano Sisinni and Stefano Rinaldi (University of Brescia, Italy)

- 12:30 Development and Application of Optical Imaging Tools for Remote Sensing of Space Weather**
Supriya Chakrabarti (University of Massachusetts Lowell, USA)

- 12:45 Magnetron-Sputtered CsPbBr₃ Thin Film Stacked Schottky Diodes as Gas Sensing Devices**
Mara Bruzzi, Leonardo Forcieri and Lucia Baldesi (University of Florence, Italy); Giovanni Casini (INFN Firenze, Italy); Enza Panzardi and Irene Cappelli (University of Siena, Italy); Anna Vinattieri (University of Florence, Italy); Ada Fort (University of Siena, Italy)

13:00 - 14:00 *University of Siena - San Niccolò building*
LUNCH

14:00 - 14:30 Room 101
CLOSING AND AWARD CEREMONY

