



55th IEEE PHOTOVOLTIC SPECIALISTS CONFERENCE

CALL FOR PAPERS

This year's conference introduces three new Tracks that replace the traditional Areas at PVSC while maintaining the same overall scope. Track and topic descriptions are provided below. When submitting your abstract, select up to three relevant topics and provide keywords to help ensure proper placement in the program.

TRACK 1: PV Materials & Devices

Photovoltaic performance continues to advance through the development of new materials, deeper understanding of device physics, device architecture engineering and advanced metrology methods. Track 1 brings together emerging materials and fundamental concepts; materials and device level advances across established material platforms (Chalcogenides, and Thin-Film; III-V; Silicon; Perovskite and Organics) with both material specific and cross cutting sessions, tandem and multijunction devices, and space photovoltaics devices. Track 1 welcomes submissions at materials and device level to distinguish a boundary with the other more system-based tracks.

TRACK 2: PV Systems, Energy Performance & Reliability

Track 2 covers the design, characterization, testing, performance, operation, and reliability of photovoltaic modules and systems. It includes module engineering and qualification; solar resource assessment and forecasting; energy yield and field performance; reliability, degradation, and diagnostics; power electronics, controls, and system engineering; and space photovoltaic *systems and flight experience*. The track welcomes experimental, analytical, modelling, and field-based work spanning module-level behavior through complete PV system performance and operation. Track 2 welcomes submissions at systems and module level to distinguish a boundary between other tracks.

TRACK 3: PV Integration, Deployments & Sustainability

Track 3 covers the integration, deployment, lifecycle, and broader impacts of photovoltaic technologies within energy systems and society. It includes grid integration, storage, and integrated energy systems; agrivoltaics, floating PV, and other dual-use applications; energy security, resilience, and cybersecurity; end-of-service and recycling solutions; supply chains, critical materials, and sustainability; and deployment, markets, policy, and community

adoption. The track welcomes technical, economic, environmental, and social research addressing how PV is integrated, deployed, sustained, and scaled.

Track 1: Photovoltaic Materials & Devices

Louise Hirst (lead - *U. Cambridge*), Ziv Hameiri (*UNSW*), Amit Munshi (*Colorado State*), Nicholas Rolston (*Arizona State*), Rebecca Saive (*U. Twente*), Anastasia Soeriyadi (*Microlink Devices*), Zhaoning Song (*U. Toledo*).

1.1 Emerging Materials, Fundamental Concepts and Novel Characterization

Breakthroughs in photovoltaic technology are often enabled by advances in fundamental science and the exploration of new materials, physical phenomena, optics and device concepts. This topic provides a forum for fundamental device physics, alternative solar-energy conversion approaches, novel and emerging materials, advanced optical management and novel characterization approaches, and may also include materials and device development beyond the absorber including for example the contacts or transporting layers.

1.2 Chalcogenides and Inorganic Thin-Films

Chalcogenide and related thin-film technologies combine strong photovoltaic performance with the potential for low-cost, high-throughput manufacturing and a broad range of applications. This topic covers **material and device level developments for CdTe, Cu₂ZnSn(S,Se)₄, Cu(In,Ga)Se₂, Sb₂(S,Se)₃, and other thin-film photovoltaic materials and devices**, including absorber synthesis and defects; interfaces and contacting schemes; advanced architectures, characterization and modelling approaches.

1.3 III-V's

III-V semiconductors offer exceptional conversion efficiency, tunable material properties and resilience in demanding environments, making them important for both terrestrial and space power applications. This topic encompasses the **full range of III-V photovoltaic research**, from materials design and epitaxial growth through device fabrication, characterization, reliability, cost reduction strategies and emerging applications.

1.4 Silicon

Silicon remains the dominant photovoltaic technology while continuing to evolve through advances in materials, passivation, device architecture, light management and manufacturing. This topic covers the full breadth of **silicon photovoltaics at the materials and device level**, including fundamental materials science and defects, high efficiency device designs, manufacturing at the cell level, and advanced modelling and *characterization*.

1.5 Perovskites and Organics

Halide perovskites and perovskite-inspired materials, dye-synthesized, quantum dots, and organic semiconductors offer compelling opportunities for high-efficiency, lightweight, flexibility, and potentially low-cost photovoltaics. This topic covers **materials development, device performance, stability and reliability, characterization, and advanced metrology approaches**.

1.6 Tandem and Multijunction Devices

Tandem and multijunction architectures offer the highest solar cell efficiencies. This topic brings together research on ***tandem and multijunction devices across all material platforms and hybrid combinations***, multi-terminal architectures, spanning fundamental design through device fabrication, characterization and reliability at the cell level.

1.7 Space Devices

Space photovoltaics operate under demanding environmental conditions, creating distinctive challenges and opportunities for materials and device development. The space sector has seen a rapid evolution in recent years driving demand and innovation. This topic covers ***photovoltaic materials and devices for space applications including established and emerging materials, device design, environmental resilience, reliability, testing and on-orbit performance***.

Track 2: Photovoltaic Systems, Energy Performance & Reliability

Committee: *Silvana Ovaitt (lead - National Laboratory of the Rockies), Umay Akkoseoglu (DNV), Michael Owen-Bellini (National Laboratory of the Rockies), Mandy Lewis (TU Denmark), Yao Y. Lao (Aerospace Corporation)*

2.1 Module Design, Characterization & Testing

This topic focuses on ***how PV modules are designed, manufactured, characterized, and tested***. Papers covering module materials and architectures; manufacturing and assembly; electrical, optical, thermal, and mechanical characterization; qualification, accelerated and environmental testing; calibration, rating, quality assurance, and relevant standards are encouraged.

2.2 Solar Resource Assessment & Forecasting

This topic focuses on ***how the solar resource and relevant environmental conditions are measured, modelled, and predicted for PV applications***. Papers covering irradiance and meteorological measurements; resource assessment and modelling; solar and PV power forecasting; variability and uncertainty; instrumentation and calibration; spectral irradiance, albedo, temperature, precipitation, snow, and other environmental inputs relevant to PV performance are encouraged.

2.3 Energy Yield, System Performance & Field Operation

This topic focuses on ***how PV systems perform and operate under real-world conditions***. Papers covering energy-yield modelling and prediction; field monitoring and performance analysis; system losses, availability, and efficiency; performance metrics and benchmarking; capacity and acceptance testing; commissioning; O&M strategies; and validation of performance models using measured field data are encouraged.

2.4 Reliability, Degradation & Diagnostics

This topic focuses on ***how PV modules, components, and systems degrade, fail, and are diagnosed over time***. Papers covering durability and reliability; degradation and failure mechanisms; accelerated testing and lifetime prediction; long-term field degradation;

diagnostics, inspection, and fault detection; inverter and BOS reliability; extreme-environment and extreme-event impacts; and methods for assessing system health and availability are encouraged.

2.5 Power Electronics, Controls, Optimization & System Engineering

This topic focuses on ***how PV systems are electrically engineered, controlled, and optimized from components through the complete PV system***. Papers covering converters and inverters; power-electronic design, modelling, and control; electrical architecture and BOS engineering; system sizing and optimization; trackers and control strategies; DC/AC configuration; component interactions; and engineering approaches for improving PV system performance and reliability are encouraged.

2.6 Space Systems & Flight Experience

This topic focuses on ***how photovoltaic modules, arrays, and power systems are designed, tested, and operated for space applications***. Papers covering space PV modules, panels, and arrays; system architecture and integration; qualification and environmental testing; AM0 calibration and performance; module- and system-level reliability and degradation; flight and on-orbit experience; failure analysis; and system-level applications of III-V and alternative PV technologies are encouraged. This topic focuses on systems to *distinguish it from Topic 1.7, which focuses on cells and materials, and the fundamentals and testing of emerging systems*.

Track 3: Photovoltaic Integration, Deployments & Sustainability

Committee: *Sarah Kurtz (lead - U. Merced), Annick Anctil (Michigan State U.), André Augusto (Dalarna U.), Anna Bruce (UNSW), Ian Marius Peters (Forschungszentrum Jülich), Arnulf Jaeger-Waldau (European Commission)*

3.1 Grid, Storage & Integrated Energy Systems

This topic focuses on ***how PV interacts with the energy system***. Papers covering interconnection of PV with the electric grid; energy storage and hybrid systems; grid services and flexibility; transmission and distribution impacts; hosting capacity, curtailment, power quality and stability; microgrids, virtual power plants, system planning, and operation of high-PV or high-renewables power systems are encouraged.

3.2 Agri-PV, Floating PV, BIPV and Other Dual-Use Applications

This topic focuses ***on where and how PV is deployed in novel or integrated applications***. Papers covering agrivoltaics, floating PV, building-integrated and building-applied PV, transportation and infrastructure applications, off-grid and remote applications, and other novel deployment configurations are encouraged. The topic includes design trade-offs, application-specific performance, co-benefits, and field demonstrations.

3.3 Energy Security, Resilience & Cybersecurity

This topic focuses on ***how PV contributes to secure and resilient energy systems***. Papers covering critical-load support, backup and islanded operation, recovery from extreme events, infrastructure resilience, cybersecurity of PV and distributed systems, communications and

controls security, and risks associated with increasingly connected energy infrastructure are encouraged.

3.4 End-of-Service & Recycling Solutions

This topic focuses on ***what happens to PV systems and components when they reach the end of service or undergo major lifecycle transitions***. Papers covering decommissioning, repair, reuse, resale, refurbishment, repowering, remanufacturing, recycling, material recovery, logistics, and technical or economic decision-making across end-of-service pathways are encouraged.

3.5 Supply Chains, Critical Materials & Sustainability

This topic focuses on ***the material, environmental, and supply-chain impacts of PV across its life cycle***. Papers covering critical-material demand and availability, domestic and global supply chains, manufacturing and material sourcing, embodied energy and emissions, life-cycle assessment, toxicity and environmental impacts, resource efficiency, sustainability metrics, and strategies to reduce supply-chain or environmental risks are encouraged.

3.6 Deployment, Markets, Policy & Community Adoption (incl. Permitting)

This topic focuses on ***the market, policy, economic, and social factors that shape PV deployment and adoption***. Papers covering deployment trends, economics, finance and markets, policy and regulatory frameworks, permitting and interconnection barriers, community adoption and acceptance, equity and energy justice, workforce development, education and outreach, and other institutional or social factors affecting PV adoption are encouraged.

INDUSTRY FORUM – PVSC 55

Committee: *Angèle Rienders (TU Eindhoven), Kristin Alberi (National Laboratory of the Rockies), Veronica Bermudez-Benito (Berbetin), Mathilde Fievez (Beyond Silicon),*

The Industry Forum 2027 program is currently under development. We will share the details with you as soon as it will be finalized. If you would like to participate in the Industry Forum or have any questions in the meantime, please feel free to contact IEEE PVSC-55 at info@ieee-pvsc.org. *More coming soon!*