



אוניברסיטת בן-גוריון בנגב
Ben-Gurion University
of the Negev

Program
23rd Sede Boqer Symposium
on Solar Electricity Production
September 5-7, 2022

George Evens Family Auditorium
Jacob Blaustein Institutes for Desert Research
Sede Boqer Campus

Organized by the Ben-Gurion National Solar Energy Center
Organizing Committee: Eugene A. Katz



Ministry of Energy
www.energy.gov.il



The Jacob Blaustein Center for Scientific Cooperation
The Jacob Blaustein Institutes for Desert Research
Ben-Gurion University of the Negev



Center for Energy & Sustainability
Ben-Gurion University of the Negev



BIDR

The Swiss Institute for
**Dryland Environmental &
Energy Research (SIDEER)**

Please note that the program includes only the names of the presenters of lectures and posters. Names of co-authors can be seen in the abstracts themselves.

Monday, September 5, 2022

9:00 – 9:30 Arrival and Registration at the George Evens Family Auditorium, Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev (Midreshet Ben-Gurion)

9:30-10:00 **Opening Greetings – 23rd Sede Boqer Symposium**

Chair: Eugene Katz

Raz Jelenik, Vice-President & Dean for R&D, Ben-Gurion University of the Negev

Ariel Novoplansky, Director, The Swiss Institute for Dryland Environmental Energy Research, Ben-Gurion University of the Negev

Gideon Friedman, Chief Scientist, Israel Ministry of Energy

10:00-11:30 **Session 1.1: Broader Perspectives and New Ideas in Photovoltaics I**

Session Chair: Dan Oron

Gideon Segev (Tel-Aviv University)

Extraction of the Spatial External Luminescence Efficiency in GaAs Using Photoluminescence Measurements and Optical Modeling

Eran Edri (Ben-Gurion University of the Negev)

Holding Both Ends of the Solar Spectrum: Quasi-one-dimensional Photovoltaic Materials for the Infrared and Visible Range

Jeffrey Gordon (Ben-Gurion University of the Negev)

Concentrator Photovoltaics for Space Missions

11:30-11:50 Coffee break

11:50-12:45 **Session 1.2: Keynote Lecture**

Session Chair: Eugene Katz

Christoph Brabec

University of Erlangen, Germany

“Accelerating Lifetime Engineering of Emerging-PV Technologies”

12:45-14:00 Lunch

14:00-16:00 **Session 1.3: Perovskite Photovoltaics I**

Session Chair: Monica Lira-Cantu

Yana Vaynzof (Technical University of Dresden)

New Concepts for Perovskite Photovoltaics

Dan Oron (Weizmann Institute of Science)
Quantum Spectroscopy Applied to Perovskite Nanomaterials

Christiane Becker (Helmholtz Zentrum Berlin)
Nano-optical Designs Enhance Monolithic Perovskite/Silicon Tandem Solar Cells toward 29.8% Efficiency

Doron Azulay (Hebrew University of Jerusalem & Azrieli College of Engineering)
Photo-electrical Properties of Quasi-2D Perovskite Comprising Diammonium Spacer Molecules with Hydroxyl Functional Groups

16:00-16:20 **Coffee break**

16:20-17:50 **Session 1.4 Theoretical Studies**

Session Chair: Christiane Becker

Leeor Kronik (Weizmann Institute of Science)
Defects, Defect Tolerance, and Self-healing in Lead Halide Perovskites: First Principles Perspective

Avi Niv (Ben-Gurion University of the Negev)
Thermodynamic Considerations of the Photovoltaic Systems Detailed Balance Law

Francesco Buonocore (ENEA, Casaccia Research Center, Rome)
Functionalization of Nanomaterials Driven by ab initio Calculations

18:00 One bus returns to Beer-Sheva

18:15 **Buses to Mitzpe Ramon for dinner and cultural event**

19:00-20:15 **Dinner**

20:15-10:15 **Astronomy – The Desert Skies in September**

The opportunity to observe the wondrous night sky under the dark-sky conditions of the Negev Highlands desert is not something that everyone has the opportunity to enjoy on a regular basis. A special program for this time of year will be presented, including observations through telescopes. The program lasts about two hours. Warm clothing should be brought, as desert nights are chilly. [Guiding provided by *BaTeva*]

Tuesday, September 6, 2022

9:00 – 9:30 Arrival at the George Evens Family Auditorium, Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev (Midreshet Ben-Gurion),

9:30-11:00 **Session 2.1: Electrochemistry and Photoelectrochemistry**

Session Chair: Iris Visoly-Fisher

Daniel Grave (Ben-Gurion University of the Negev)
Charge Carrier Photogeneration and Collection in Metal-oxide Thin Film Photoelectrodes for Solar Fuel Production

Avner Rothschild (The Technion)
Decoupled Water Splitting for Green Hydrogen Production: Reshaping Water Electrolysis

Muhammad Bashouti (Ben-Gurion University of the Negev)
Fabrication and Surface-Functionalization of Semiconductor Nano/micro rod arrays

11:00 -11:20 Coffee break

11:20-12:10 **Session 2.2: Keynote Lecture**

Session Chair: Oded Millo

Yury Gogotsi
Drexel University, Pennsylvania, USA
“MXenes – Synthesis, Optoelectronic Properties and Solar Energy Applications”

12:10-13:30 Lunch

13:30-14:45 Poster session I in lobby of Evens auditorium

14:45-16:45 **Session 2.3 Organic Photovoltaics**

Session Chair: Francesca Brunetti

Nir Tessler (The Technion)
The Interplay between Device and Material Properties in Determining Solar Cell Performance

Gitti Frey (The Technion)
Glassy Phases: The Silent Players in Organic Solar Cells

Pavel Troshin (IPCP RAS)

Intrinsic and Extrinsic Degradation Pathways in Organic Absorber Materials for PV Applications

Jens Wenzel Andreasen (Technical University of Denmark)

Model Supported in-line Characterization of Roll-to-Roll Coated Organic Solar Cells

16:45-17:00 Coffee break

17:00-19:00 **Session 2.4 Solar Electricity: Industrial Perspective**

Session Chair: David Faiman

Yuval Zohar (Head of Policy, Planning & Emergency, Electricity Authority)
Ashalim Solar Projects in Light of National Renewable Energy Goals

Achiam Tigger (Negev Energy Ashalim)
Experience of Operating the Largest Solar Storage in Israel

Pierre Kohn (EDF Renewables - Israel)
Ashalim1 vs. Ashalim2: GenX / GenY – PV Solar Plants Evolution

Nimrod Levy (ICL)
Green Sdom project – ICL

Discussion

19:30-21:00 **Festive Dinner**

21:00 Bus returns to Beer-Sheva (after dinner)

Wednesday, September 7, 2022

9:00-9:15 Arrival at the George Evens Family Auditorium, Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev (Midreshet Ben-Gurion),

9:15-10:10 **Session 3.1: Keynote Lecture**

Session Chair: Avner Rothschild

Uri Banin

Hebrew University of Jerusalem

“Semiconductor Nanocrystals for Photocatalytic Applications”

10:10-10:30 Coffee Break

10:30 – 13:00 Session 3.2: Perovskite Photovoltaics II**Session Chair: Yana Vaynzof****Francesca Brunetti** (University of Rome)*From Flexible Perovskite Solar Cells to Large Area Modules: Challenges and Perspectives***Monica Lira-Cantu** (Catalonian Institute of Nanoscience and Nanotechnology)*Halide Perovskite Solar Cells: Strategies for High Stability***Iris Visoly-Fisher** (Ben-Gurion University of the Negev)*Environmental Effects of Pb Leaching from Photovoltaic Halide Perovskites***Mark Khenkin** (Helmholtz-Zentrum Berlin)*Perovskite Solar Cells in Outdoor Conditions: Year of Continuous Operation***Lioz Etgar** (Hebrew University of Jerusalem)

Bifacial Fully printable low dimensional perovskite solar cells

13:00-14:15 Lunch**14:15-15:15 *Poster session II in lobby of Evens auditorium*****15:15-16:45 Session 3.3: Agro-Photovoltaics****Session Chair: Naftali Lazarovich****Abraham Kribus** (Tel-Aviv University)*Agrovoltaics: Achievements and Challenges***Andrea Reale** (University of Rome Tor Vergata)*Semi-Transparent Polymer Solar Cells & Modules for Greenhouse Applications: An Innovative Approach for Agrivoltaics***Roei Grimberg** (Ben-Gurion University of the Negev)*Effect of Semi-Transparent OPV Modules Installed Inside Greenhouses on Microclimate and Crops***16:45 – 17:05 Coffee Break****17:05-18:35 Session 3.4 Solar Thermal Technologies****Session Chair: Avi Niv****Carmel Rotschild** (The Technion)*Modular CSP based on a New Heat Engine for 100% Solar Availability at Grid Parity***Gennady Ziskind** (Ben-Gurion University of the Negev)

Thermal Energy Storage: State-of-the-Art and Future Trends

Alon Lidor (ETH Zürich)

Development of High Temperature Heat Recovery System for a Solar Redox Reactor

18:35

Closing remarks (Eugene Katz)

18:50

Bus returns to Beer-Sheva

<http://in.Ben-Gurion University.ac.il/en/solar/Pages/Symposium.aspx>, or write to sbsolarsymposium@bgu.ac.il.

ABSTRACTS FOR THE POSTER SESSION
(In Alphabetical Order by Presenter)

Experimental Investigation of Self-Cleaning Solar Panel Device using Electrodynamic Force, **David Amidan**, (NRCN – Nuclear Research Center of the Negev)

Process for the Synthesis of Nanostructures based on Two-dimensional Materials under Concentrated Solar Irradiation, **Timotheé Barbe**, PROMES-CNRS & University of Perpignan

Visible to Near infrared all Inorganic Perovskite - PbS-conjugated Nanostructures and their Optical Interaction, **Tal Binyamin**, Hebrew University of Jerusalem

Binder Free TiO₂ Paste for Flexible Polymer Dye Sensitized Solar Cells, **Kishore Kumar Devarepally**, Ben-Gurion University of the Negev

(BiXSb1-X)2Se3 Thin Films for Short Wavelength Infrared Region Solar Cells, **Yaniv Dror**, Ben-Gurion University of the Negev

Voltage Matched Multi Junction Solar Modules, **Moshe Einav**, Kfar Uria

Enhancing the Performance of State-of-the-Art Solar Cells Using Universal Hole Transport Layer, **Hela Fadool**, The Technion

Mapping the Spatial Contribution to Photoluminescence and Photovoltage in Perovskite Solar Cells, **Mor Fiegenbaum-Raz**, Tel Aviv University

In-situ study of Photoluminescence Degradation of Perovskite Thin Films under Concentrated Sunlight, **Rafael Fleischman**, Ben-Gurion University of the Negev

Conversion of Solution Deposited PbS Thin Films to MAPbI₃ Perovskite, **Naama Gatenio**, Ben-Gurion University of the Negev

Influence of IR Solar Radiation Filtering on Solar Cell, **Or Gindy**, Shamoon College of Engineering

An Examination of Molecular-Wires Metal Oxide Hybrid Materials as a Protective Layer for Halide Perovskite Photoelectrodes, **Yuval Harari**, Ben-Gurion University of the Negev

Machine Vision Based Characterization of Perovskite Thin Film Properties, **Milan Harth**, Technical University of Munich

Enhanced Photocatalytic Activity of Cs₄PbBr₆/ WS₂ Hybrid Nanocomposite, **Philip Nathaniel Immanuel**, Ariel University

Nickel Nitride Passivation Stabilizes Halide Perovskite-Based Inverted Solar Cells, **Anat Itzhak**, Bar-Ilan University

Water and Halide Perovskite Perovskites: Is H₂O only at the Surfaces or also in the Bulk?, **Naga Prathibha Jasti**, Bar-Ilan University

New Deposition Method for Pb-Free Halide Perovskite, with Tunable Bandgap and Improved Stability, **Adi Kama**, Bar-Ilan University

Efficiency Enhancement of P3CT-NA Based MAPbI₃ Solar Cells via Interfacial Engineering, **Said Kassou**, Ben-Gurion University of the Negev

Automated experiment guiding of cSpBbR₃ Perovskite Quantum Dots, **Ioannis Kourdoudis**, Technische University Munich

- Benign Solution-processed (Bi_xSb_{1-x})₂Se₃ Alloys for Short Wavelength Infrared Solar Cells*, **Jitendra Kumar**, Ben-Gurion University of the Negev
- Direct Hot Carrier Impact on Photovoltage of a Solar Cell*, **Oleksandr Masalskyi**, Vilnius Technical University
- Ratchet based Ion Pumps for Fine Tuning of Electrochemical Reactions*, **Dafna Meltser**, Tel Aviv University
- Pb Sequestration to Prevent Possible Pollution of the Environment from Halide Perovskite-based Devices*, **Rene L. Mendez**, Bar-Ilan University
- Photovoltaic Operation at Extreme Temperatures*, **Gilad Moses**, Ben-Gurion University of the Negev
- Integrated Back Contacts Silicon Solar Cells as a Platform for 3-Terminal Tandem Solar Cells and Hybrid Photoelectrochemical Tandem Cells*, **Eyal Nir**, Tel Aviv University
- Highly Efficient Semitransparent Perovskite Mini-Module for Four Terminal Tandem Integration by Optimization of Transparent Conductive Oxide*, **Gopinath Paramasivam**, Helmholtz-Zentrum Berlin
- Sputtered and Thermally Evaporated MoO₃ Thin Films as a Buffer Layer for Perovskite Solar Cells*, **Ramarajan Ramarathen**, Ariel University
- Ink-Jet Printed TiO₂ Thin Layers with Embedded Au Nanoparticles as Functional Layers for Perovskite Solar Cells*, **Sofia Rubtsov**, Ariel University
- Enhanced Specular Back Reflectors for Broadband Light Absorption in Metal Oxide Ultrathin Film Absorbers*, **Sa'ar Shor-Peled**, Ben-Gurion University of the Negev
- Investigating Fine Electronic Structure in Carbon Nitride Materials by Electron Paramagnetic Resonance Spectroscopy*, **Ekatarina Shabratova**, Helmholtz-Zentrum Berlin
- Optical and Electrical Performance of an Agrivoltaic Field with Spectral Beam Splitting*, **Ben Shalom**, Tel Aviv University
- "Cold" Composite TiO₂ Electron Transport Layer for Perovskite Photovoltaics*, **Mykola Shatalov**, Ariel University
- Self-Healing in Lead Halide Perovskite Thin films*, **Pallavi Singh**, Weizmann Institute of Science
- Climate Change Mitigation: Drylands Conversion to Photovoltaic Fields vs. Afforestation*, **Rafael Stern**, Weizmann Institute of Science
- Towards the Commercialization of Perovskite Solar Cells: Encapsulation Strategies and Outdoor Stability Testing*, **Kenedy Tabah Tanko**, Catalanian Institute of Nanoscience and Nanotechnology
- Solvent Composition Regulates the Optical Bandgap and Work Function of Antimony Selenide Nanowires Deposited from Thiol-amine Solvent Mixtures*, **Anchal Vashishtha**, Ben-Gurion University of the Negev
- Novel Interlayer Between the Photoactive and Hole Conductive Layer in Perovskite Solar Cells*, **Sudhakar VEDIAPAN**, Ben-Gurion University of the Negev
- Polymeric 2D Dielectric Array for Solar Cell Absorption Improvement: Simulation and Dip-pen Nanolithography (DPN) Fabrication*, **Ravit Yosupov**, Shamoon College
- Controlling the Device Functionality by Solvent Engineering, Solar Cell versus Light Emitting Diode*, **Shir Yudco**, Hebrew University of Jerusalem