VISOLY-FISHER Iris

Materials for Solar Energy Conversion and Storage
http://www.bgu.ac.il/~irisvf/

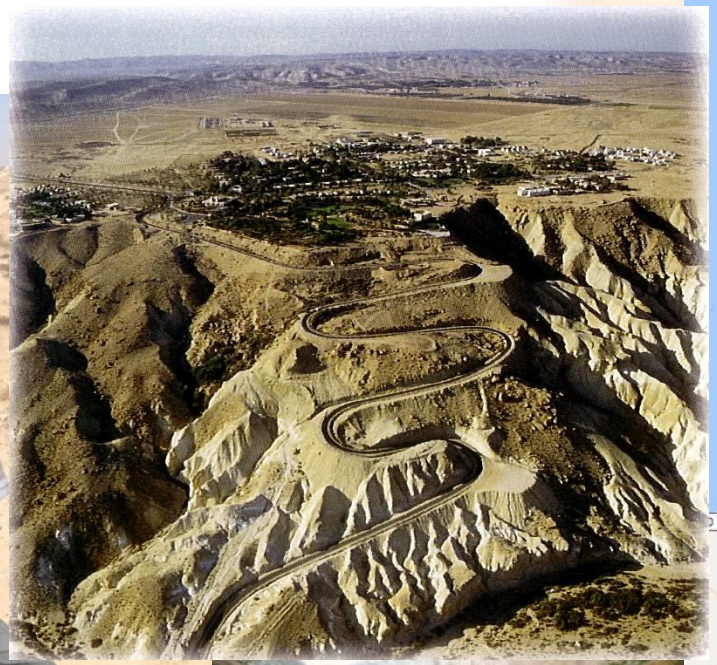
Solar energy research at BGU

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

Ben-Gurion University
of the Negev

Ben-Gurion National Solar Energy Center @ Ben-Gurion University of the Negev, Sede Boqer

https://in.bgu.ac.il/en/solar/Pages/default.aspx



BIDR
The Jacob Blaustein Institutes for Desert Research

8 Researchers, ~20 students and postdocs, 3 technicians

Multi-scale research

Nanoscale

Atoms of silicon

Microscale

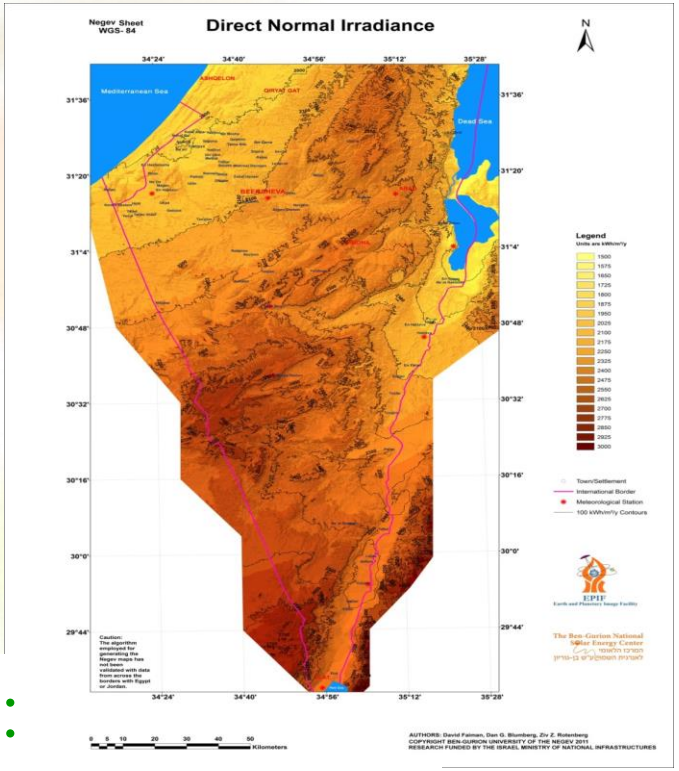
Macroscale

Macroscale

Meteorology:

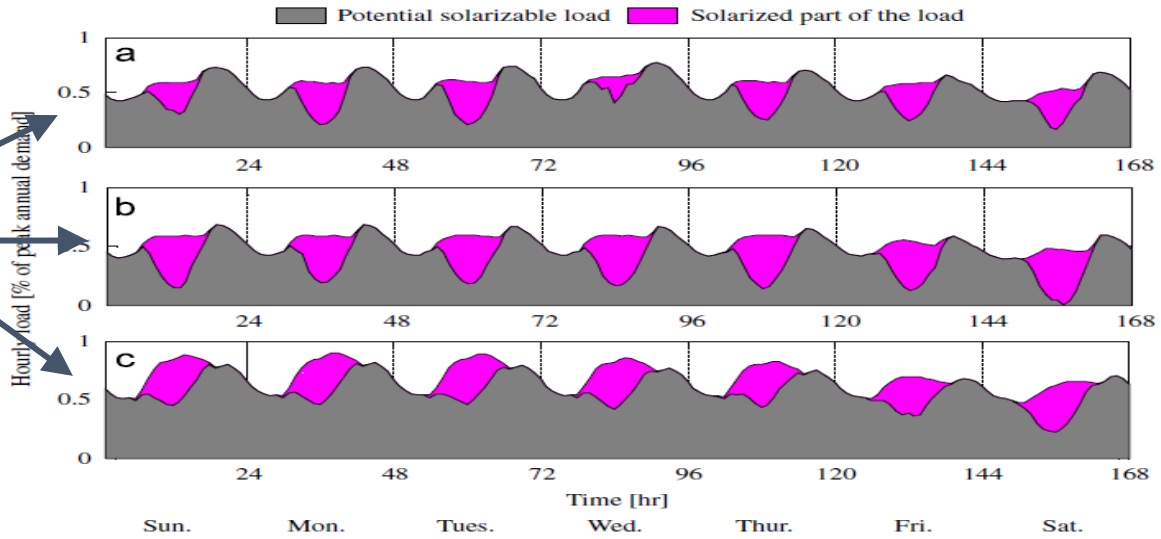
Negev Radiation Survey:
for power station feasibility and efficiency

Prof. David Faiman



Grid penetration of large PV systems:

winter
spring
summer



Energy Policy 2010, 38, 10, 5457

MRS Energy & Sustainability 2014, 1 , E3

Microscale Outdoor pilot-level testing

The solar spectrum is near standard test conditions

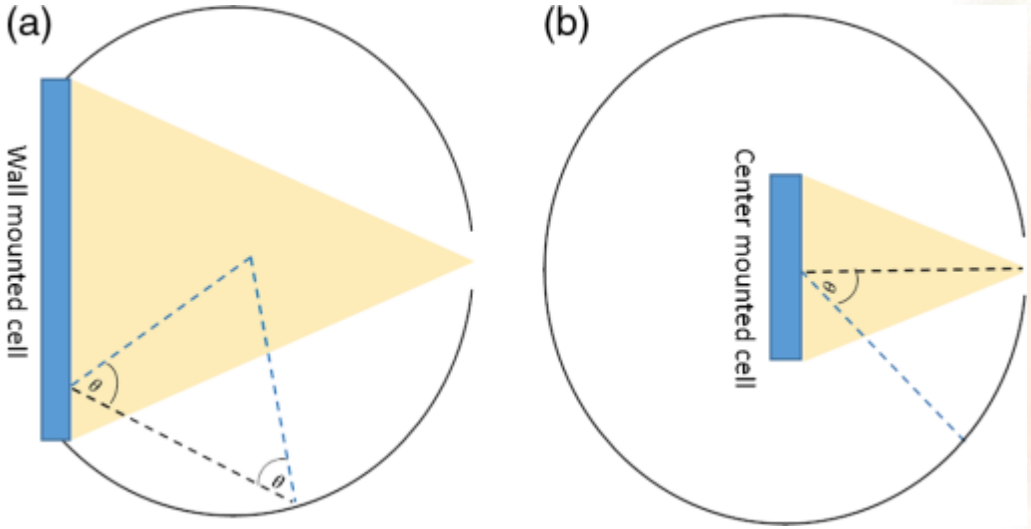
Sunlight concentrating optics – using mirrors

SolFocus™

Prof. Daniel Feuerman
Prof. Jeff Gordon

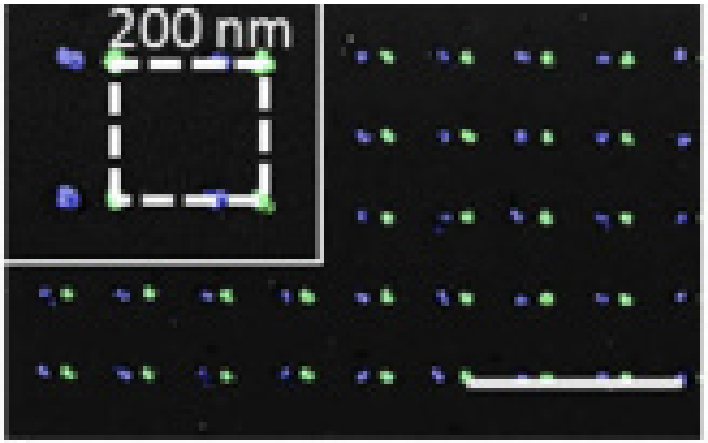
Applied Optics 2019, 58, F14 **Journal of Optics 2016, 18, 073004**

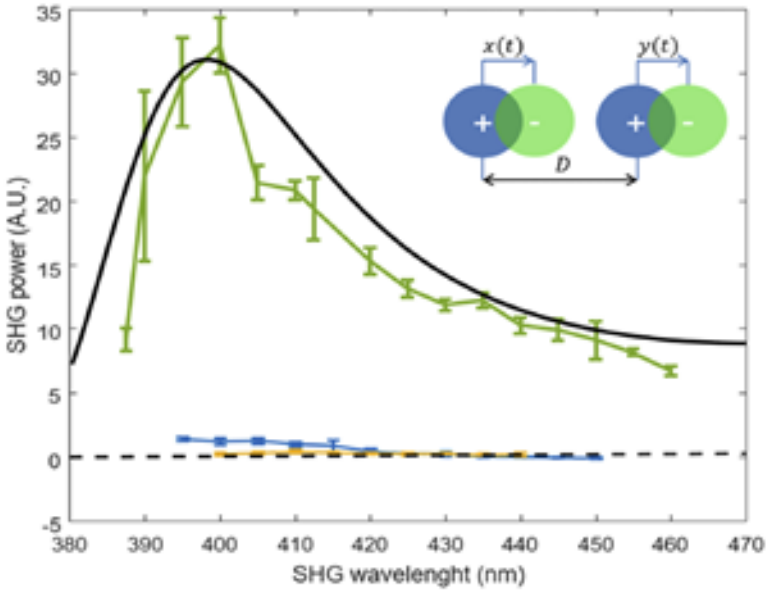
External light trapping for solar cells



Dr. Avi Niv

Wavelength conversion – non-linear nano-optics

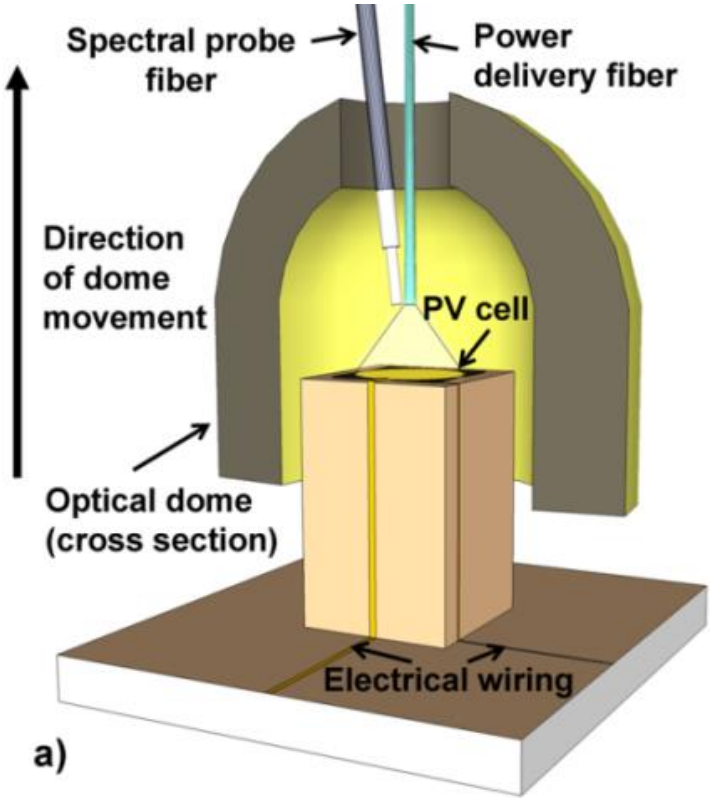




Optics Express 2020, 28, 31468
Optics Letters 2018, 43, 3662

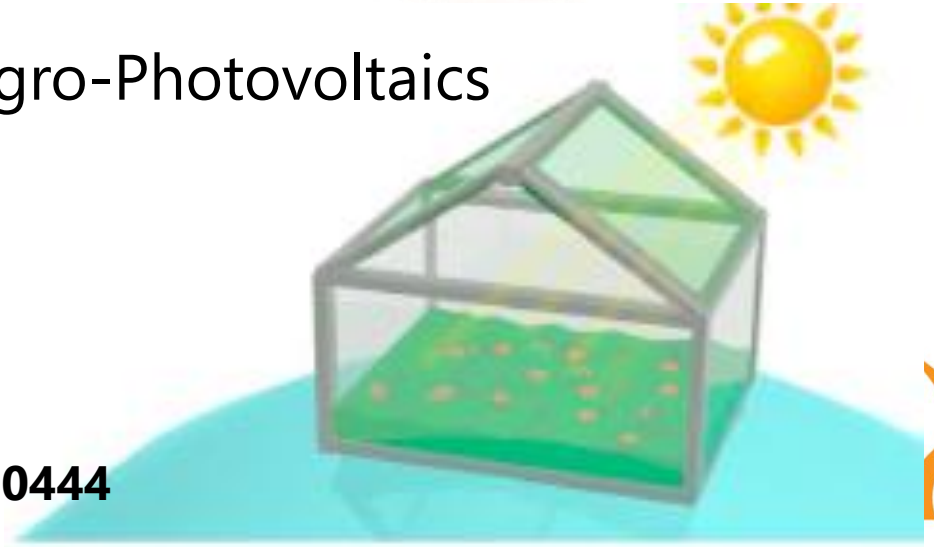
New concepts for ultra-efficient Photovoltaic devices

Prof. Eugene Katz



- Concentrated photovoltaics
- Photon recycling
- hybrid Thermoelectric-PV

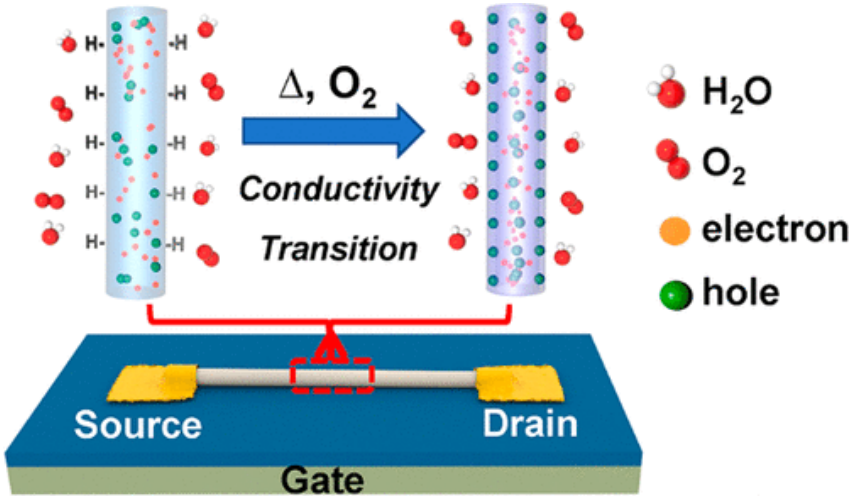
  Thermosolar-PV devices
- Agro-Photovoltaics



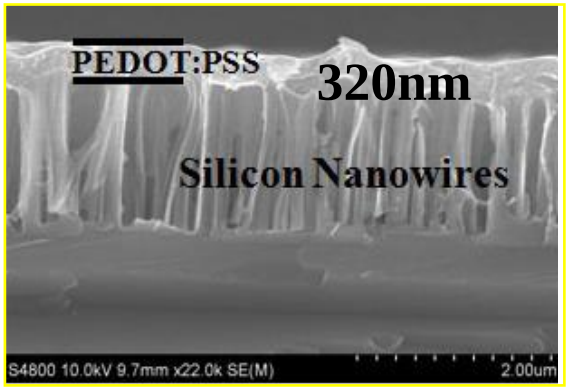
Nature Energy 2020, 5 (1), 35
Advanced Materials 2018, 30 (41), 1800444

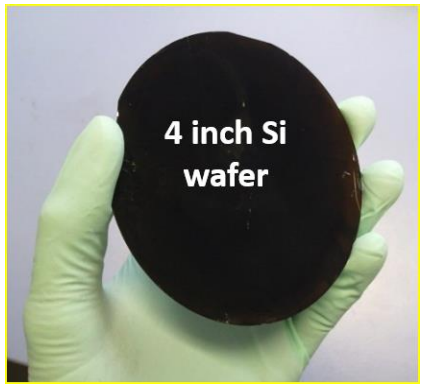
Nanoscale

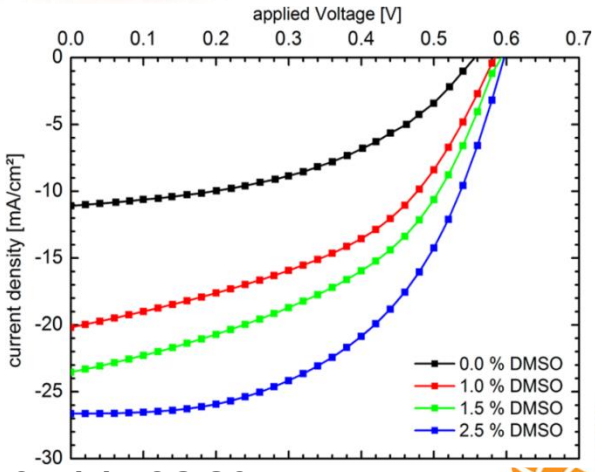
Surface nanostructures for manipulating optoelectronic material properties



Dr. Muhammad Bashuti





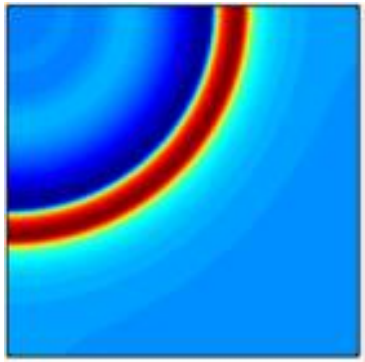


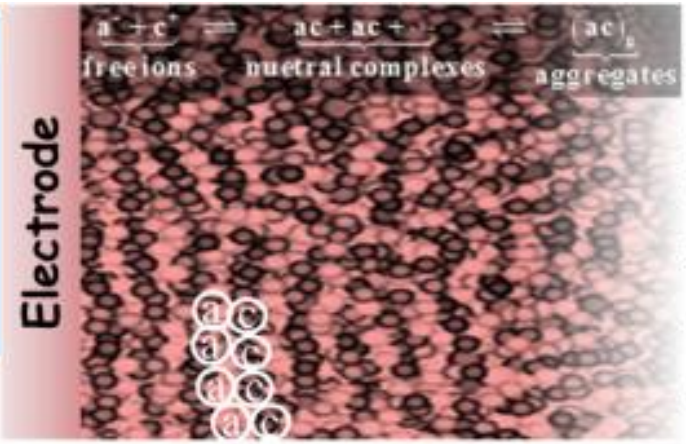
Langmuir 2019, 35, 48, 15526

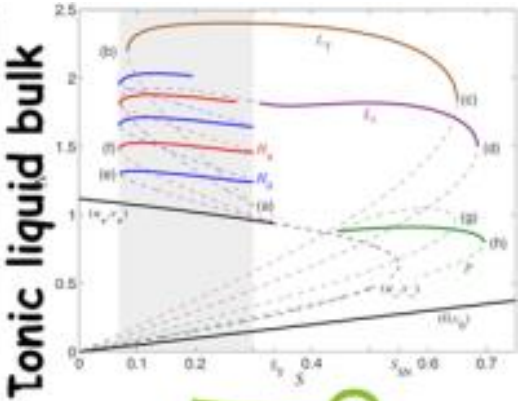
Nano Lett. 2020, 20, 11, 8369

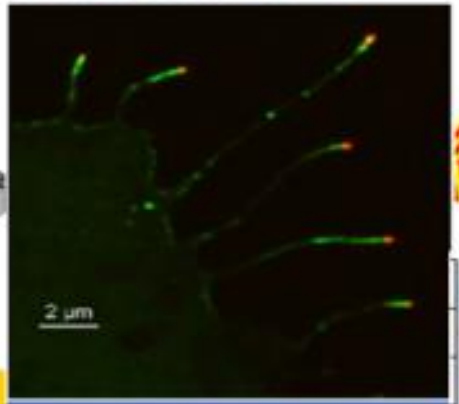
Theory of pattern formation in renewable energy systems

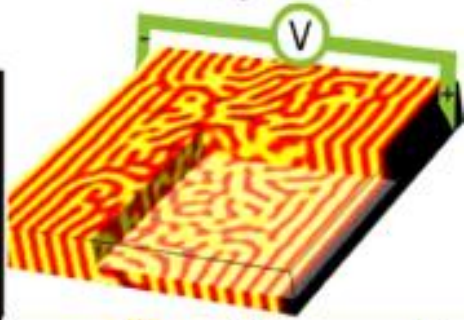
Dr. Arik Yochelis

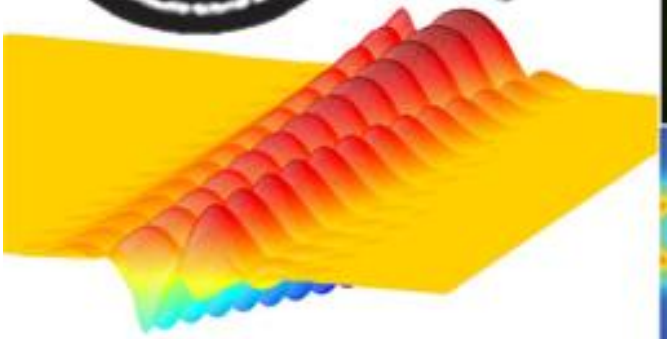


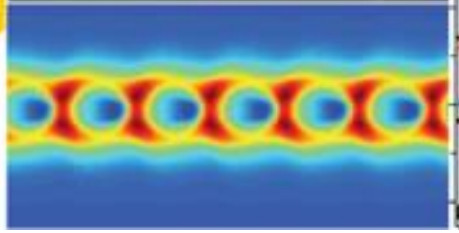


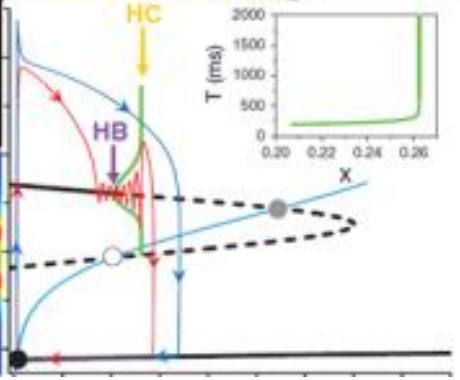










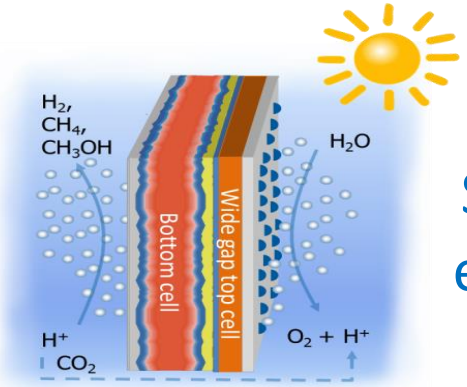


Nature Communications, 2018, 9, 4060; **Chaos, 2020, 30, 073104**

Materials for Solar Energy Conversion and storage

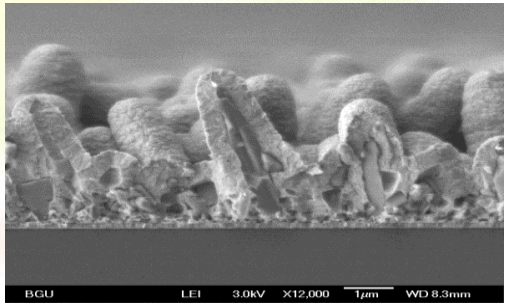
Prof. Iris Visoly-Fisher

↓ Cost



Solar Fuels for energy storage

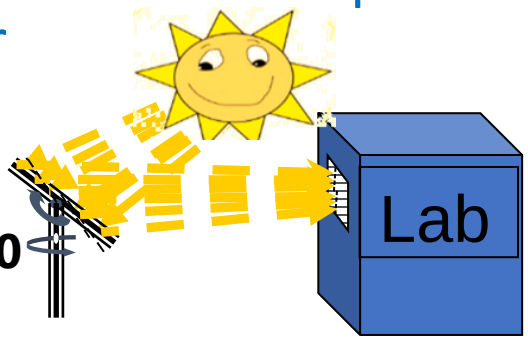
↑ Energy conversion efficiency



Nanomaterials for photovoltaics

↑ Lifetime

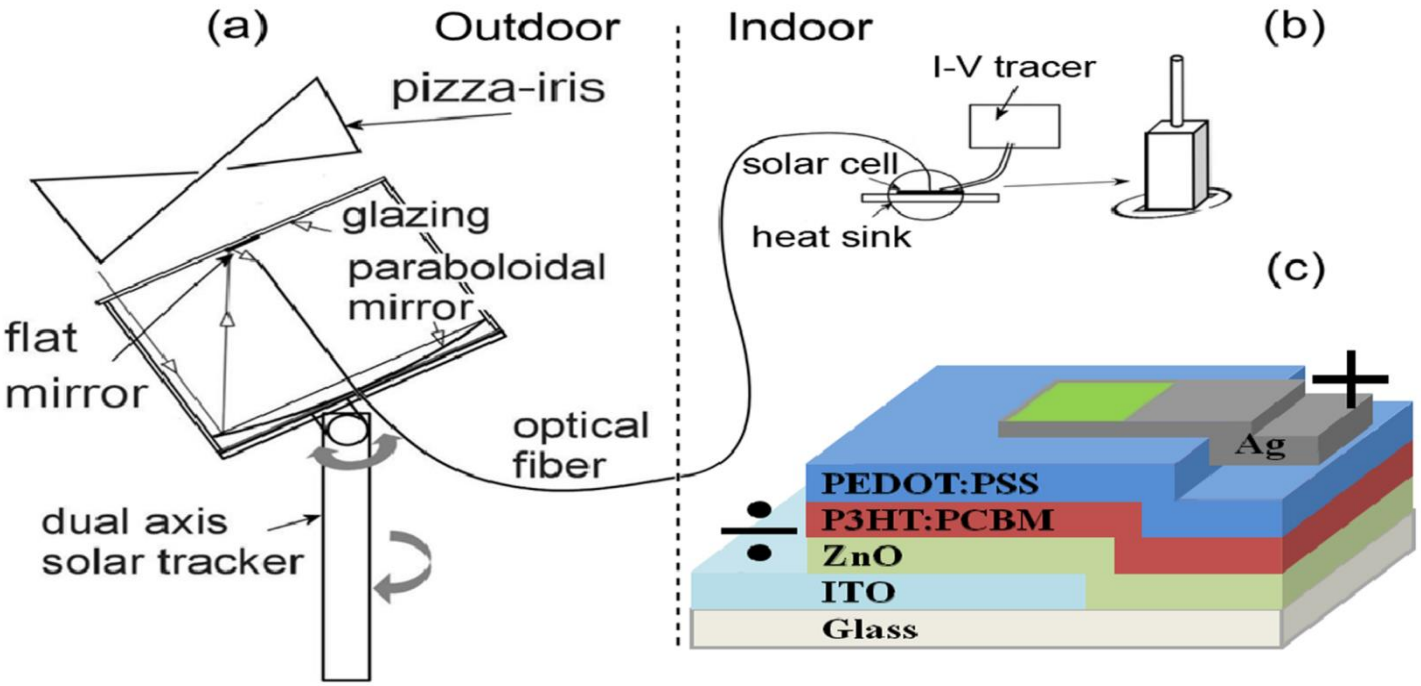
Natural sunlight for stability studies

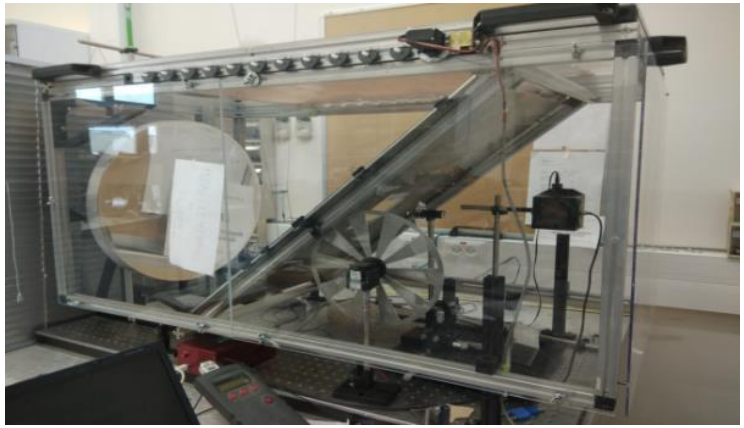


Energy & Environmental Science, 12 (2019), 550
Chemistry of Materials, 32 (2020), 1031

Accelerated stability tests of PV materials and devices using concentrated sunlight

With Profs. Gordon, Feuermann





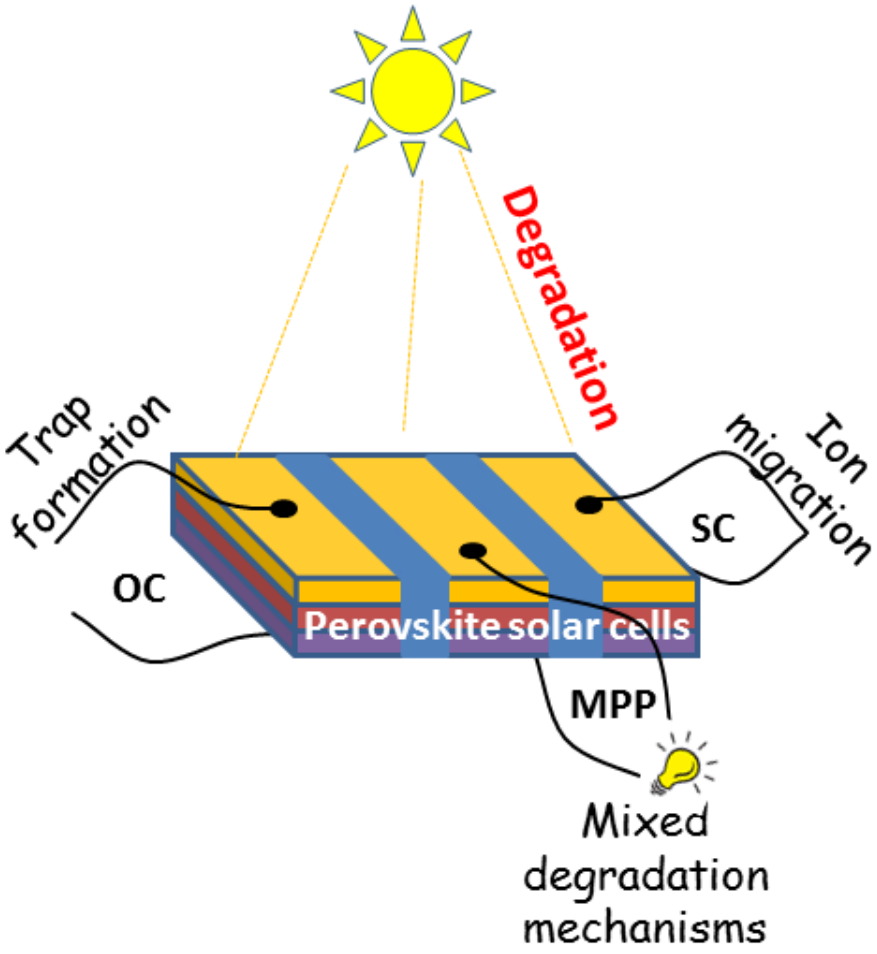
Fast stability screening of materials and device

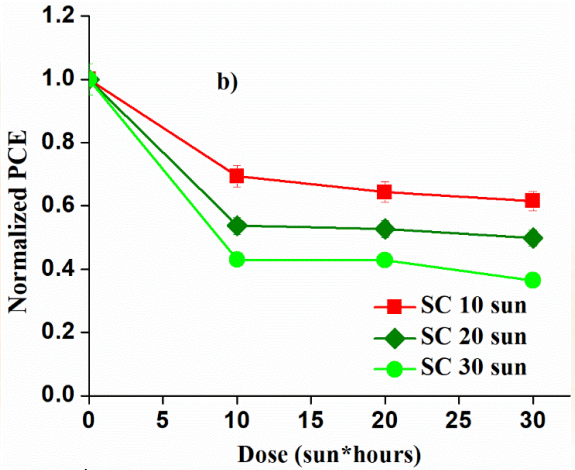
Halide mixing $MAPb(I_{1-x}Br_x)_3$

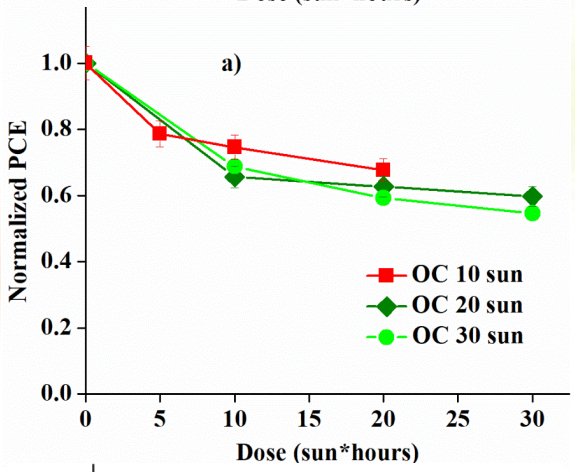
$MAPbX_3$	Solar absorption	Stability* * 100 suns + T ≈ 50°C
X = I	✓ ✓	☹
X = Br	✓	✓ ✓
Mixed Halide $MAPb(I_{1-x}Br_x)_3$	✓ ✓	☹ ☹

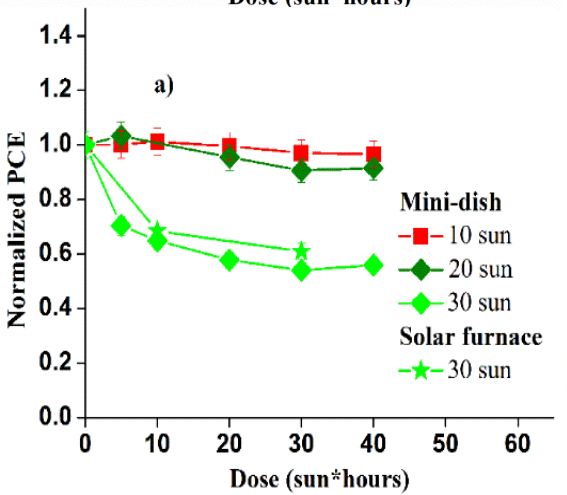
J. Phys. Chem. Lett., 2015, *6* (3), pp 326–330

Bias-dependent degradation mechanisms in perovskite solar cells Deduced from sunlight intensity-dependent measurements



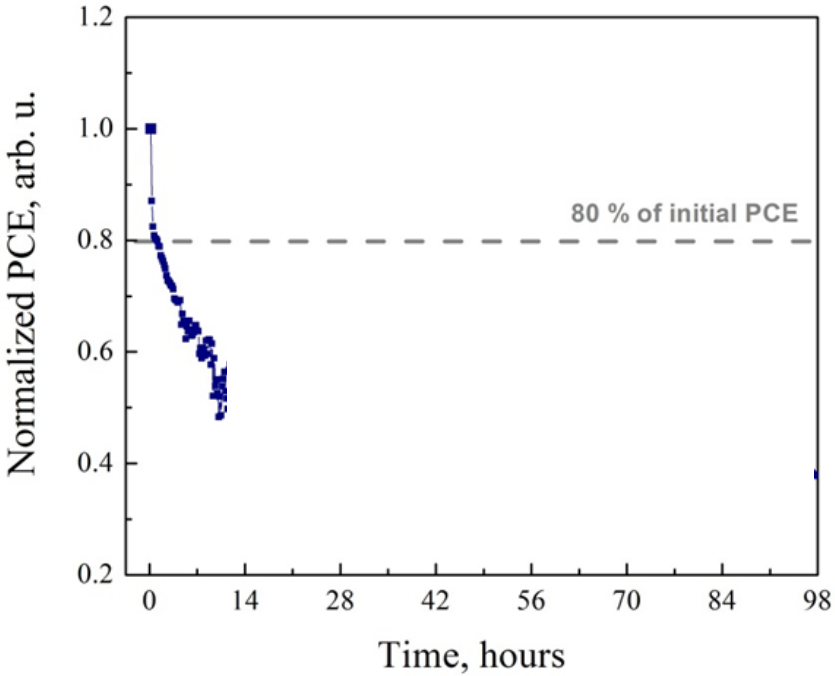




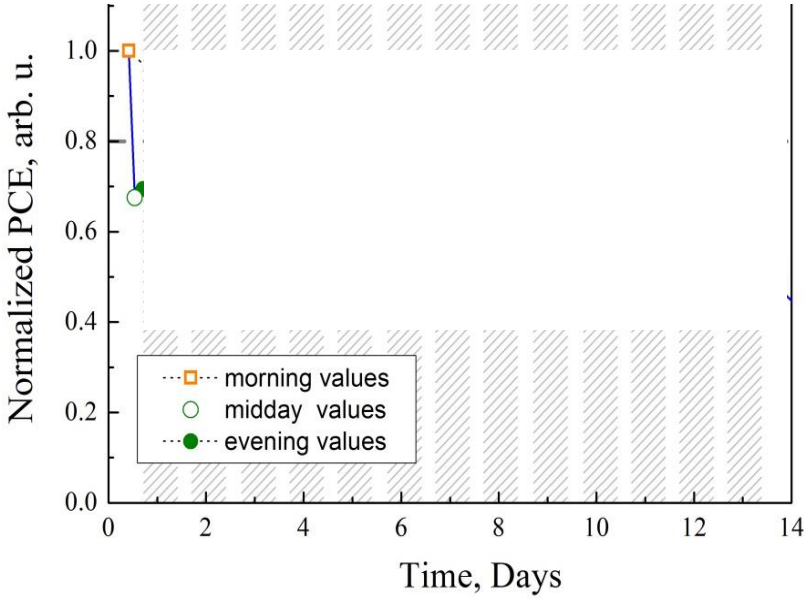


Energy & Environmental Science, 12 (2019), 550 – 558
Solar RRL (2019) 1900335

Perovskite cell recovery @ outdoor operation



Continuous illumination (indoors)



Outdoor illumination (day/night)

- ***ACS Applied Energy Materials* 1 (2018), 799**
- ***Energy and Environmental Science*, 11 (2018), 739**

8 Researchers, ~20 students and postdocs, 3 technicians

Multi-scale research

Nanoscale ***Microscale*** ***Macroscale***

Atoms of silicon