



**Ben-Gurion University of the Negev
Blaustein Institutes for Desert Research**

The Swiss Institute for Dryland Environmental and Energy Research
Alexandre Yersin Department of Solar Energy and Environmental Physics

Stability, Degradation and Recovery Dynamics of Perovskite Solar Cells (PhD lecture)

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Abstract:

Perovskite solar cells (PSCs) have exhibited impressive power conversion efficiency, but to be considered for large scale commercial applications these cells have to be stable under operating conditions including exposure to sunlight, heat and electric bias. Here we present stability studies using concentrated sunlight, which allows rapid screening of the degradation parameters of the cells. Our experimental methodology allows independent control of sunlight intensity, the sample temperature and environment during the exposure.

Specifically, accelerated degradation studies to determine factors affecting degradation at different bias conditions were performed. Stress testing of perovskite solar cells showed that faster degradation was found for cells held at short circuit (SC) under concentrated sunlight at the initial stage of outdoor exposure. However, cells kept at SC conditions showed better long-term stability compared to cells kept at open circuit (OC) conditions. We also found that light intensity was more important than dose for cell degradation at SC conditions, while dose was the determining factor at OC. This indicates that different degradation mechanisms are dominant under different bias conditions.

We further investigated complex recovery dynamics of PSCs photo-degraded to a different extent, under simulated light indoor and outdoor, which allowed separating reversible and irreversible processes, as well as “apparently irreversible” ones (coined for the processes with recovery time exceeding one night). Recovery dynamics were found to vary at different degradation stages, which may again point to different degradation mechanisms.

Date & Location:

Tuesday, November 26, 2019, 11:00

Lecture room, Physics Building (ground floor)