
**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

# Metal-oxide photoelectrodes for solar energy conversion and storage

***Prof. Daniel Grave,***
*Department of Materials Engineering,*
*Faculty of Engineering Sciences, Ben-Gurion University*
dgrave@bgu.ac.il

Abstract:

Photoelectrochemical solar fuel production is a promising route for converting solar energy into clean, renewable fuel such as hydrogen. The greatest challenge towards efficient solar fuel production is in the design of photoelectrode materials that harvest light and drive electrochemical processes. Metal-oxides are particularly suitable as photoelectrode materials due to their abundance, low cost, and stability in aqueous solution—requirements that traditional semiconductors do not meet. Despite much progress, a path forward towards designing devices with high efficiency has remained elusive, partly due to electron-electron and electron-lattice interactions in these materials, which introduce deviation from conventional semiconductor behavior.

In this talk, I will demonstrate how we use epitaxial thin films as model systems to study the effect of light-matter interaction on photoelectrochemical behavior in complex metal-oxides. We combine these observations with time-resolved spectroscopy to show that excitation-wavelength-dependent charge carrier localization is an overlooked, yet fundamental, limitation for achieving high efficiencies in several metal-oxide materials. We then develop a new method to quantify the spectral profile of the mobile charge carrier photogeneration yield in any thin film photoelectrode material and provide a path forward towards improved devices for solar energy conversion and storage.

Date & Location:

**Monday, May 18, 2021, 11:00**