GTEP Grand Technion Energy Program
תוכנית האנרגיה ע"ש גרנד

הפקולטה למדע והנדסה של חומרים
Department of Materials Science and Engineering

Technion Israel Institute of Technology

Dr. Gideon Segev

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Gideon Segev received his bachelor's degree in electrical engineering at the Ben-Gurion University in Israel in 2008. Shortly thereafter, he started his graduate studies at the Tel Aviv University solar energy lab. His research was mainly concerned with detailed modeling of Photon Enhanced Thermionic Emission (PETE) for solar energy conversion. After finishing his PhD Gideon shared his time between two post-doctoral positions. The first at the Tel Aviv University where he lead the development of multiple state electrostatically formed nanowire transistors and a second position at the Technion where he focused on solar water splitting with hematite photoanodes. On March 2016 Gideon joined the Joint Center of Artificial Photosynthesis (JCAP) at the Lawrence Berkeley National Lab, where he is working on advanced semiconductor devices for solar fuels generation.

Will lecture on:

Semiconductor devices for solar energy conversion and storage

The utilization of solar energy has increased dramatically in recent years. However, due to the inherently intermittent nature of the solar resource, wide scale utilization of solar energy must be accompanied by means for energy storage. From all the possible storage methods, chemical storage is most appealing because of its high energy density and the fact that fuels are already used by many industries and vast applications. In this talk I will present our recent advances in the development of semiconductor devices for solar energy conversion and storage.

First, we use established multi-junction photovoltaic cells, coupled to a novel composite catalytic coating, to demonstrate a high efficiency spontaneous overall water splitting device. This allows us to better understand the basic function of such systems and the primary factors that affect energy conversion efficiency. Through this study, we identified current mismatches in different semiconductor absorber layers to limit overall conversion efficiency. Next, we have developed a new device architecture, which allows the coupling of advanced semiconductor photoelectrodes, including emerging materials, to conventional photovoltaic systems, thus allowing us to overcome losses due to current mismatch by extracting excess charge as electrical power. While this novel device architecture allows losses due to current mismatches to be overcome, photocarrier recombination in individual layers still limits overall energy conversion efficiency. To understand and overcome the losses, we have developed a new variant to quantum efficiency measurements, which allows us to determine where photocarriers are lost. By taking this parallel approach to addressing efficiency loss, at both the device architecture and component material level, we provide routes to a next generation of high efficiency solar energy conversion and storage systems.

Wednesday, January 4th, 2017, 12:30 p.m.

Department of Materials Science and Engineering

David Wang Auditorium, 3rd floor, Dalia Maydan Bldg.

Technion City, Haifa