סמינר כימיה פיסיקלית ואנליטית

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נושא:

COUPLING THE PHOTOSYSTEM WITH NANOSCALE PHOTOCATALYSTS FOR OVERALL SOLAR WATER-SPLITTING

This research was performed under the supervision of
Assoc. Professor Lilac Amirav and advised by Prof. Noam Adir

ההרצאה תתקיים בחדר הסמינרים הפקולטי

Coupling the Photosystem with Nanoscale Photocatalysts for Overall Solar Water-splitting

Hydrogen generated from solar-driven water-splitting has the potential to be a clean, sustainable and abundant energy source. An important advancement towards rendering hydrogen more accessible was accomplished in our lab. Nearly 100% photon-to-hydrogen production efficiency was obtained by utilizing nanoparticle-based photocatalysts, composed of Pt-tipped CdSe@CdS rods. While this structure was found to be highly active for hydrogen production, it is not suitable for overall water-splitting as it is encumbered by photochemical instability, the Achilles heel of CdS. Unfortunately, prolonged irradiation of its suspensions leads to photocorrosion. Thus, a sacrificial electron donor for hydrogen evolution from water is required. In order to overcome this challenge, we examined means for merging such nanometric photocatalytic rods with natural photosynthetic apparatus embedded in thylakoid membranes. Upon illumination, the photosystem apparatus promotes water oxidation, alongside the generation of electrons that could potentially be harvested. Hence, a synergistic combination of the photosystem and the rods are expected to result with overall water-splitting.

In this seminar, I will present our endeavors working towards an integrated functional rods-photosystem design. These include two main trajectories: (1) Shuttling the electrons generated by the photosystem to the rods via a redox couple; and (2) Direct electrical conduction of charges via an electrode, which includes the design and production of a novel hybrid nanorod photosensitizer structure for improved hole extraction.