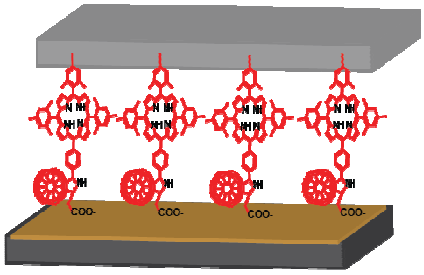
Iris Visoly-Fisher

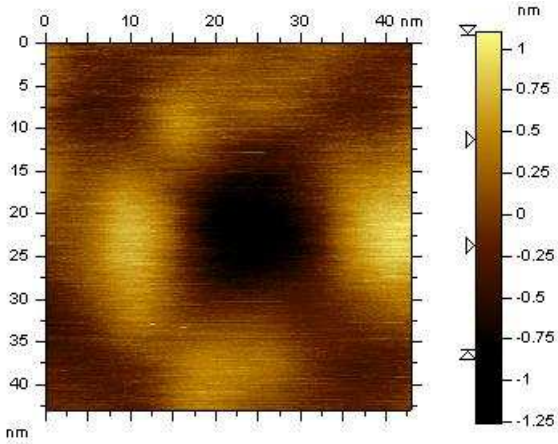
Molecular Optoelectronics

Organic semiconductors are excellent candidates for low-cost photovoltaic (PV) cells, since they offer easy, clean processing and compatibility with low weight, flexible substrates. The organic PV materials can be polymers or small molecules. Biosynthesis-inspired molecules mimicking the roles of the reaction center can absorb light and convert the energy to charge separation within the molecule. Unlike other photovoltaic systems, photon absorption and charge separation happens in a single entity rather than at the interface between materials.

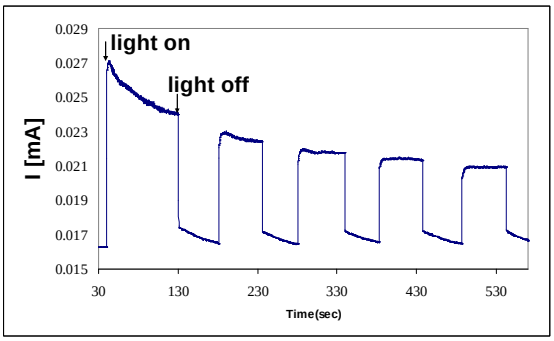


Porphyrin-C60 dyads for charge transfer at organic-inorganic interface

Our research deals with studying photovoltaic properties of organic materials at ultra-high resolution, enabling (1) stdying single molecules in order to develop better design criteria for photovoltaic energy conversion and opto-electronic applications of such molecules, both macroscopic and in nano-scale energy supplying devices and photodetectors which can be used in portable, low-energy consuming electronics (with Prof. D. Gust, Arizona State University) (2) develop novel, high efficiency nanostructured molecular photovoltaic devices and new molecular dyes for energy conversion, (3) develop advanced schemes for molecular solar cells devices using lateral polymeric photonic crystals for absorption enhancement (with Dr. R. Shikler, Elec. Eng., BGU), and (4) study the properties of each phase in hybrid photovoltaic materials at high resolution (with Dr. G. Frey, RBNI, Technion)



High-resolution AFM topography image of the surface of a hybrid photovoltaic film



Photovoltaic current in nano-structured photoelectrochemical cell