הטכניון - מכון טכנולוגי לישראל

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

הפקולטה להנדסה כימית
ע"ש וולפסון
The Wolfson Department of Chemical Engineering

Wolfson Department of Chemical Engineering Seminar

Lecture Hall 6, Wolfson Department of Chemical Engineering, March 23rd, 2016, at 13:30

Single walled carbon nanotubes as optical sensors at the nanoscale

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Single walled carbon nanotubes (SWCNTs), graphene sheets rolled up into a cylinder, have unique physical properties with commensurately revolutionary applications in nanotechnology. Their electronic properties, including whether a tube is semiconducting or metallic, are completely determined by the nanotube's particular lattice structure, termed its chirality. Semiconducting SWCNTs have intrinsic bandgap fluorescence of excitonic nature over a wide range of the near infrared (nIR) regime. Their fluorescence emission benefits from high photo-stability, lack of photobleaching, and narrow spectral bandwidth. Upon tailored surface functionalization, SWCNT spectral response is sensitive to the local environment, exhibiting a modulation of fluorescent intensity or a shift of the peak emission wavelength, enabling real-time optical detection. In this talk, I will present the recent discovery of a SWCNT-heteropolymer complex that recognizes the protein fibrinogen with high selectivity, using the concept of Corona Phase Molecular Recognition (CoPhMoRe). In this approach, a heteropolymer is adsorbed onto and templated by the surface of an optically-active nanoparticle to recognize a specific target analyte. Upon analyte binding, the optical response of the underlying SWCNT scaffold renders it an optical nanosensor. This is the first demonstration of CoPhMoRe for macromolecular targets, opening new avenues for synthetic, non-biological antibody analogues with promise for medical and clinical applications.

About the speaker:

Dr. Gili Bisker is a postdoctoral associate in the Department of Chemical Engineering at Massachusetts Institute of Technology (MIT). She earned her bachelor's degree in Mathematics and Physics, as a graduate of the Technion Excellence Program. She received her Master's degree in Physics and a Ph.D. degree in Nanoscience and Nanotechnology, also from the Technion – Israel Institute of Technology. In her doctoral research, Dr. Bisker worked on ultrafast resonant interactions between light and noble metal nanoparticles and the resulting plasmonic effects for controlled drug release and cancer therapy applications. As a postdoctoral researcher, Dr. Bisker has developed novel optical nanosensors for bio-molecules by creating synthetic recognition sites on fluorescent single walled carbon nanotubes scaffolds. Dr. Bisker has won numerous awards for her research including the Gutwirth Prize, the Russell Berrie Scholarship, the Zeff scholarship, a triennial fellowship for excellence in the Converging Technologies Program, an UNESCO-L'ORÉAL fellowship for young women in life sciences, a Technion-MIT fellowship for post-doctoral studies, and a biennial fellowship for outstanding postdoctoral women from The Council for Higher Education. She has been recognized for her teaching roles as well, winning the Excellence in Teaching award from the Technion Department of Physics.

Refreshments served at 13:15