Complex Liquids/Nanostructure/Macromolecules

Technion-Israel Institute of Technology

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Under the supervision of Prof. Eyal Zussman and Prof. Yachin Cohen

Will talk on

" Charge-Transfer Electrospun Sensors "

Charge transfer complexes (CTC) are spontaneously formed at room temperature, exhibit metallic/semiconductor conductivity, are composed of organic, usually low-toxicity compounds, with a bonding strength of tens kJ/mol. The main challenge of exploiting the electrical conductivity of CTC is to control the percolation threshold along a preferred direction. In this work, conductive organic nanofibers were fabricated by a co-electrospinning process of poly(vinylidene fluoride-co-hexafluoropropylene) (PVDF-HFP) solutions, which contain tetrathiafulvalene (TTF) and tetracyanoquinodimethane (TCNQ) in the shell and core solutions, respectively. In the presence of a sufficiently strong electric field, jetting sets at the droplet tip, which results in solidified PVDF-HFP nanofibers embedded with the aligned CTC composed of TTF/TCNQ. The electron donor TTF and the electron acceptor TCNQ migrated toward each other, within the compound droplet, to produce conductive CTC crystals. In order to increase the CTC concentration within the electrospun fibers, a semi-soluble CTC (TTF and ferric chloride) was blended in PVDF-HFP solution. Fiber diameters ranged between 100 and 500 nm. X-ray analysis indicated that the CTC crystals were aligned with the long molecular direction parallel to the nanofiber axis. The electrospun nanofibers were collected to form a fiber mat, which was evaluated as a working electrode in a three-electrode cell system, exhibiting maximal differential conductance of 50 μmho. Addition of WO_3 nanoparticles as a catalyst to the TTF solution increased of the CTC crystallization within the nanofibers and enabled its effectiveness in ampereometric detection of glucose.

<u>Note special time and venue</u>

Tuesday 27.10.15

11:00, Resnick Conference Room, Chemical Engineering Building