复旦大学物理系 物质科学报告

Time: 2:00pm, Thursday, 2019.3.21
Location: C108, Jiangwan Physics Building

Metabolite and Assemblies: Physiology, Pathology and Nanotechnology

Ehud Gazit
Tel Aviv University

The formation of ordered nanostructures by molecular self-assembly of proteins and peptides represents a central direction in nanotechnology. Indeed, polyamides provide superior features as materials with diverse physical properties. A reductionist approach allowed the identification of extremely short peptide sequences, as short as dipeptides, which could form well-ordered amyloid-like -sheet-rich assemblies comparable to supramolecular structures made of much larger proteins. Some of the peptide assemblies show remarkable mechanical, optical and electrical characteristics. Among the electrical properties semiconductivity, piezoelectricity and pyroelectricity are most remarkable. Among the unique properties that were identified are the high mechanical rigidity with metallic-like point stiffness and Young's moduli, the quantum confinement of excitons that results in blue luminescence and non-linear optical phenomena, and piezoelectric properties with high effective piezoelectric coefficient values comparable to lithium niobate. Another direction of reductionism utilized natural non-coded amino acid, aminoisobutryic acid, to form short superhelical assemblies. The use of this exceptional helix inducer motif allowed the fabrication of single heptad repeats utilized in various biointerfaces, including their use as surfactants and DNA-binding agents. Two additional directions of the reductionist approach include the use of peptide nucleic acids and co-assembly techniques. A recent addition to the repertoire of building blocks includes small metabolites such as amino acids and nucleobases. The diversified accomplishments of the reductionist approach, as well as the exciting future advances it bears, will be discussed.

Ehud Gazit is a Professor and Endowed Chair at the Department of Molecular Microbiology and Biotechnology, Faculty of Life Sciences and the Department of Materials Science and Engineering, Faculty of Engineering and a member of the Executive Council of Tel Aviv University. Gazit is also the academic director of the BLAVATNIK CENTER for Drug Development and Head of the Laura Schwartz-Kipp Institute for Biotechnology. Gazit received his B.Sc. at Tel Aviv University, and got his Ph.D. at Weizmann Institute of Science in 1997. He has been a faculty member at Tel Aviv University since 2000, after completing his postdoctoral studies at Massachusetts Institute of Technology (MIT). Gazit had published more than 250 papers in top journals. He is also one of the most prolific inventors in Israel academia with more 100 international patents including 40 issued US patents. His technology transfer achievements were acknowledged by inclusion in the 2008 list of 100 Innovations from academic Research to Real-World Application by the Association of University Technology Managers (AUTM) and in a list of 100 Technology Offers stemming from EU Biotechnology RTD results of three Research Framework Programmes (FP5, FP4, and FP3). He is also an awardee of the European Research Council (ERC) Advanced Grant (in 2016). He delivered more than 250 invited presentations. Gazit had received numerous awards and honors including Landau Research Award, Hesterin Award and Kadar Family Award.