Department of Materials
Science and Engineering

Iby and Aladar Fleischman
Faculty of Engineering
Tel Aviv University

הפקולטה להנדסה
ע"ש איבי ואלדר פליישמן
אוניברסיטת תל אביב

המחלקה למדע
והנדסה של חומרים

You are cordially invited to attend this seminar to be held on

Monday, March 20th, 15:00
Room 118, Wolfson Mechanical Engineering Building

Coiling and twisting nanotubes: From fundamental nanoelectromechanics to nanocoils and nanogyros

Prof. Ernesto Joselevich

Department of Materials and Interfaces - Weizmann Institute of Science

Short Abstract

Coils play important roles in electricity generation, electronics, magnetic devices and motors. Nanotube coils would be similarly desirable structures for nanoelectronics and nanoelectromechanical systems (NEMS). Following the observation of carbon nanotube serpentines several years ago, we recently demonstrated the self-coiling of single-wall carbon nanotubes into defect-free coils of up to more than 70 turns. Magnetic measurements show that the coils are highly conductive, but shorting between adjacent turns severely degrade their inductive behavior. Current efforts with few-wall carbon nanotube coils could provide the proper sheathing to create functional inductive devices, such as electromagnets, dynamos, transformers and motors.

What happens when you twist a nanotube? We studied the torsional mechanical and electromechanical behavior of nanotubes made of different materials (C, WS2, BN, and BCN) and found intriguing differences between all of them. Recently, we have been able to create torsional resonators based on inorganic nanotubes, and found them to have higher resonant frequencies and quality factors than those based on carbon nanotubes. This demonstrates that inorganic nanotubes could be attractive building blocks for NEMS, including nanogyroscopes.

Biosketch

Prof. Ernesto Joselevich has pioneered the guided growth of horizontal nanotubes and nanowires on surfaces and led the field of nanotube torsion. He has received several awards, including the 2007 Israel Chemical Society Excellent Young Scientist Prize and the 2017 Tenne Prize in Nanoscience. In 2014, he was awarded a European Research Council (ERC) Advanced Grant.