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

Tuesday, June 12th, 14:00

Room 106, Wolfson "Tochna" Building

Materials for Soft Robotics

Dr. Aslan Miriyev

Department of Mechanical Engineering, Columbia University in the City of New York

*Nature Communications

Engineering nature-like adaptive and intelligent robots requires development of material systems that permit inherent actuation, sensing and computerized control. In my talk, I will present my novel compact soft material-actuator approach possessing actuation ability as inherent responsive property, aimed at replacing conventional rigid motors and the existing soft-actuation solutions based on pneumatic or hydraulic devices. Specifically, I will discuss the composition-structure-properties relationships in a 3D-printable silicone/ethanol composite material and its implementation as a soft artificial muscle. In addition, I will present my work on conductive elastomer composites, followed by successful fabrication of all-soft material-actuators incorporating soft conductive heaters. Automated single-step fabrication of silicone-matrix composites using a newly-developed proprietary Artificial Muscle 3D-printer will also be demonstrated. Finally, I will highlight the barriers that still need to be overcome before truly nature-like intelligent autonomous systems can be engineered, including development of self-sensing soft-hard material systems and control of their functionality and performance using artificial intelligence (AI). I see this engineering challenge as a natural next step in the development of smart multifunctional composite materials combining sensing and actuation capabilities for Soft Robotics.

Short bio Dr. Aslan Miriyev is a materials scientist specializing in engineering and manufacturing of soft and structural functional materials, with a particular emphasis on Soft Robotics.Dr. Miriyev obtained his Ph.D. in Materials Engineering from Ben-Gurion University of the Negev (BGU), Israel, where he has been supervised by Prof. Nachum Frage and Prof. Adin Stern. Currently, Dr. Miriyev is a post-doctoral research scientist in the group of Prof. Hod Lipson at Columbia University, New York City. In this capacity, Dr. Miriyev has developed an approach spearheading a paradigm shift in the Soft-Material Robotics research, as it allows the conventional motors and actuation devices to be replaced by self-contained composite materials. His work received widespread media coverage by more than 70 media sources in more than 15 languages, while also reaching more than 7.3 million social networks users.