Department of Materials Science and Engineering

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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

Wednesday, December 14th, 16:00
Room 206, Wolfson Mechanical Engineering Building

Bio-Inspired Crystal Growth: From biomineralization to band gap engineering and single crystalline nano-porous gold

Prof. Boaz Pokroy

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Short Abstract

In the course of biomineralization, organisms produce a large variety of functional biogenic crystals that exhibit fascinating mechanical, optical, magnetic and other characteristics. More specifically, when living organisms grow crystals they can effectively control polymorph selection as well as the crystal morphology, shape, and even atomic structure. Materials existing in nature have extraordinary and specific functions, yet the materials employed in nature are quite different from those engineers would select.

I will show how one can emulate specific strategies used by organisms in forming structural biogenic crystals, and to apply these strategies biomimetically so as to form new structural materials with new properties and characteristics.

The two main examples I will present are the formation of nano-hybrid composites with tuned electronic properties1 and the formation of curved and nano-porous single crystals of gold2,3.

Utilizing these biological strategies can indeed open new routes for the formation of new materials.

1. Brif A, Ankonina G, Drathen C, Pokroy B. Bio-inspired Band Gap Engineering of Zinc Oxide by Intracrystalline Incorporation of Amino Acids. Adv Mater 2014;26: 477.

2. Koifman-Khristosov M, Kabalah-Amitai L, Burghammer M, Katsman A, Pokroy B. Formation of Curved Micron-Sized Single Crystals. ACS Nano 2014; 8: 4747.

3. Koifman-Khristosov M, Bloch L, Burghammer M, Kauffman Y, Katsman A, Pokroy B. Sponge-like nanoporous single crystals of gold. Nature Communications 2015;6;8841.

Biosketch

Boaz Pokroy is currently an Associate Prof. in the Department of Materials Science and Engineering at the Technion Haifa Israel. Prior to that he was a post doctoral fellow and a Fulbright scholar in the lab of Prof. Joanna Aizenberg at the School of Engineering and Applied Sciences Harvard University, Cambridge MA USA and Bell Labs, Murray Hill NJ.

The research of Pokroy focuses on biomineralization and bio-inspired surface engineering. He studies the structure of bio-minerals on the atomic, nano and meso-scales using state of the art high-resolution characterization techniques such as high-resolution synchrotron diffraction and aberration corrected TEM. Based on the strategies that organisms use to produce natural materials, his lab also develops novel bio-inspired materials, such as semiconductors whose band gap can be tuned by the incorporation of intracrystalline biological molecules; controlling the short range order of nano-amorphous materials and fabrication of superhydrophobic/superoleophobic surfaces for various applications.

Pokroy is the recipient of an ERC starting grant since 2012 and won the Norman Seiden Prize for excellence in research. He has published over 70 papers in peer-reviewed journals as well as 6 patents.