The Iby and Aladar Fleischman
Faculty of Engineering
Department of Materials Science and Engineering

אוניברסיטת תל-אביב
TEL AVIV UNIVERSITY

הפקולטה להנדסה
ע"ש איבי ואלדר פליישמן
המחלקה למדע והנדסה של חומרים

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

Monday, January 18th, 16:00
Room 120, Wolfson Building of Mechanical Engineering

Biological Controls of Intracellular Mineralization Processes – Materials Science in *vivo*

Dr. Assaf Gal

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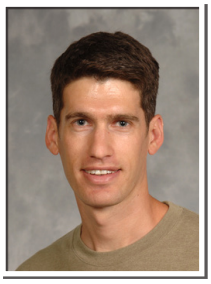
Many organisms evolved the remarkable ability to form elaborate mineralized skeletons. They do so at ambient conditions, using simple building blocks readily available at their environment. During the mineralization process, these organisms exert unparalleled control over every aspect of the forming mineral, often yielding a material that seems to defy the constraints derived from its own structure. Recent improvements in experimental techniques, both in vivo and in vitro, enabled the elucidation of key features, common to many of these biological processes. A widespread strategy is the usage of amorphous precursor phases as flexible intermediates in the construction of a crystalline phase. In addition, the biominerals are often hybrid organic-inorganic materials where the organic macromolecules control crystal nucleation and growth as well as mineral stability.
In my talk, I will focus on the lessons gained from studying two calcium carbonate phases. The first one is an amorphous phase formed by higher plants in order to scatter light inside leaf tissues. This material is constructed by the deposition of nanometer-sized amorphous particles into a confined volume. The second is a crystalline phase that demonstrates the highest degree of biological control on crystal nucleation, orientation, and growth, all occurring inside a unicellular marine alga. The study of these biological systems and complimentary in vitro experiments has yielded a comprehensive understanding of the toolbox available for living cells in order to control mineralization processes.

Biosketch



Dr. Assaf Gal is an Alexander von Humboldt postdoctoral fellow conducting a collaborative project at the Max-Planck Institute of Colloids and Interfaces and the Max-Planck Institute of Molecular Plant Physiology, both on the same science campus in Potsdam. The research aims for a molecular understanding of the various controls over biological crystallization in a model group of calcifying algae, coccolithophores. Assaf pursued his direct-track doctoral research (granted 2014) at Profs. Lia Addadi and Steve Weiner's joint group at the Weizmann Institute of Science, exploring biomineralization pathways in higher plants. As a PhD student he won the Clore foundation fellowship and a prize of excellence by the Feinberg Graduate School. In 2008 he completed a B.A. in Biology and a B.A. in Geology, both cum laude, at Ben-Gurion University.