

THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT
FALL COLLOQUIUM SERIES PRESENTS:

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New Insights into the Growth of Atomically-Thin Semiconductors

Research in 2D materials has been intense in the last two decades due to the unique scientific and technological opportunities such materials offer. Hence, research on the synthesis of layered materials and their heterostructures is of crucial importance for the fulfillment of their potential as functional materials in novel and existing technologies. The main body of this talk will be dedicated to the growth status of transition metal dichalcogenides (TMDCs), while describing our attempts to improve and study their growth mechanism. In order to achieve so, a set of capabilities were developed and will be discussed, such as seeded-growth and pulsed-growth approaches. These methodologies enabled us to better understand the process and thus improve significantly the crystallinity of the grown atomically-thin layer. The latter can be achieved by controlling the nucleation and growth of individual domains or/and via the so-called "quasi-van der Waals" epitaxial growth. These two mechanisms will be explained in detail. Finally, other research topics currently running in our lab, including the complex synthesis of heterostructures and the use of 2D materials for nanofabrication, will be shortly described as well.

Ariel Ismach is an Associate Professor at the department of Materials Science and Engineering in Tel Aviv University. He holds a BSc. in Materials Engineering from Ben-Gurion University of the Negev, and an MA and PhD in Materials and Interfaces from the Faculty of Chemistry, Weizmann Institute. He was awarded a prize from the Israel Chemistry Society for his doctoral thesis on "epitaxial approaches for the self-organization of single-wall carbon nanotubes". In 2009 he moved to Berkeley for a post-doctoral position at the Department of Electrical Engineering, University of California–Berkeley and the Materials Science Division of the Lawrence Berkeley Laboratory. In 2011 he joined the group of Prof. Ruoff in the department of Mechanical Engineering, at the University of Texas in Austin, where he led a small group of Ph.D. students and postdocs studying the growth and characterization of various 2D materials. He joined the Materials Science and Engineering department at Tel Aviv University in October 2014, as the head of the 2D Materials Laboratory. Prof. Ismach's current research interests includes the development of methodologies for the growth of atomically-thin semiconductors and heterostructures, study of their growth mechanism, charge transfer in 2D heterostructures (organic-inorganic) and surface chemistry modification schemes.

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In person only; no Zoom

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