CENIDE & WIN Seminar Series on 2D-MATURE

DFG IRTG 2803 & NSERC CREATE

Albert Dato

Harvey Mudd College

"Vodka, Diamonds, and Graphene"

May 2nd, 2024
10:00 a.m. ET / 16:00 p.m. CET

Albert Dato is an Associate Professor of Engineering at Harvey Mudd College (HMC), which is an undergraduate institution that is focused on science, mathematics, and engineering. His research program at HMC seeks to discover solutions to energy and environmental challenges through the synthesis and applications of advanced materials. His work on polymer-matrix nanocomposites is supported by a Faculty Early Career Development (CAREER) award, which is the U.S. National Science Foundation's most prestigious award in support of early-career faculty. Under the mentorship of Prof. Michael Frenklach, he received his Ph.D. in Applied Science & Technology in 2009 from the University of California, Berkeley. He discovered the substrate-free gas-phase synthesis of graphene at the University of California, Berkeley. After receiving his Ph.D., he founded one of the first companies to bring graphene to market. He also worked as a process development engineer at Novellus Systems Inc. and as a scientist at Air Liquide Electronics US LP. Driven by his passions for teaching undergraduates, scientific research, and increasing diversity in science, he joined the HMC faculty in 2014.

Graphene is a single layer of carbon atoms that possesses remarkable mechanical, thermal, and electrical properties. Graphene can be created by exfoliating graphite into monolayer flakes or forming two-dimensional sheets on substrates like copper and silicon carbide. However, graphene can also be synthesized without graphite or substrates by delivering ethanol directly into atmospheric-pressure plasmas. This presentation will introduce the substrate-free gas phase synthesis of graphene and tell the fascinating story of its discovery. Furthermore, the unique structure, composition, and features of gas-phase-synthesized graphene (GSG) will be described, and the key advantages of GSG relative to other forms of graphene will be discussed. Applications that have been developed for GSG will be presented, such as ultrathin support films for transmission electron microscopy, lubricant additives, highly water-repellent coatings, and polymer-matrix nanocomposites.