Department of Physics & Astrophysics

University of Delhi

Seminar

Title: ***Exploring the Role of Impurities in Colloidal Vapor Deposition: Insights from Nucleation and Growth Kinetics***

Speaker: **Prof. Chandan K. Mishra**

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IIT Gandhinagar

Date: February 20, 2024 (Tuesday)

Time: 3:30 P.M.

Venue: Seminar-cum-Committee Room

Abstract

The formation of thin films via vapor deposition plays a crucial role in the fabrication of microelectronics, photonic bandgap materials, and in the fundamental understanding of vital natural processes like biomineralization. Despite considerable progress, the occurrence of impurities during the deposition process is an unavoidable hurdle. While there have been extensive investigations into the impact of impurities on fully developed structures, the microscopic underpinnings of their involvement during nucleation remain largely unexplored. In this talk, we delve into the intricate interplay between impurities and adatoms during the early stages of crystallization, particularly focusing on their influence on nucleation and growth kinetics. We investigate the role of impurities, emphasizing immobile impurities that share similar size, geometry, and interaction energy with adatoms. Through a series of vapor deposition experiments focusing on the behavior of precursor clusters with and without immobile particles, we uncover intriguing insights into the thermodynamic and kinetic stability of the growing monolayer. Our findings underscore the profound significance of mobility and impurity on the growth kinetics of epitaxial crystallization, presenting a framework for tailoring material properties.