

New frontiers in tuning the properties of semiconductor materials

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Characterization of point defects is key in materials science research and crucial for a wide range of fields and applications. In electronic and photonic materials point defects dictate the optical, electrical, and magnetic properties.

In this talk I will describe a few powerful techniques for atomic scale characterization of defects, present recent developed technologies, and show how engineering and navigation of point defects revealed interesting new physics in wide band gap semiconductors such as light driven permanent transition from insulator to conductor in undoped Ga_2O_3 (Phys Rev B 104, 245208, 2021) and provided unique tools to manipulate the material properties and drive their response in many applications. I will discuss how defect engineering and modulating localized states in the band gap of materials may open new frontiers to tuning semiconductor properties and developing novel devices.