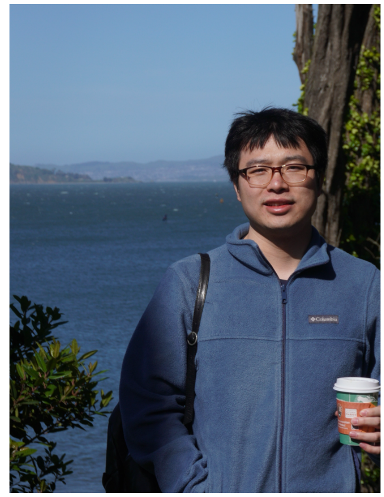
UNIVERSITY OF MICHIGAN

Mingyuan Chen



Engineering Phonon Polaritons in van der Waals Materials

Monday, May 15, 2023
10:30 am
Host: Prof. Stephen Forrest

Abstract:
Light trapped at the nanoscale, deep below the optical wavelength, exhibits an increase in the associated electric field strength, which results in enhanced light-matter interaction. Such hybrid light-matter modes involve collective oscillations of polarization charges in the matter are so-called polaritons. In recent years, enhanced light-matter interactions through a plethora of dipole-type polaritonic excitations have been observed in van der Waals (vdW) materials, this class of quantum materials provide idea platform to study light-matter interactions at the nanoscale. Polaritons in vdW materials offer desired properties, such as low loss, tunability, and high confinement as well as various potential applications in subdiffraction focusing, emission engineering, sensing, etc. Polaritons associated with different constituents can interact to produce unique optical effects by design, study the basic properties of polaritons and new methods to engineer polaritons is of great importance in the nano-optics field. In this talk, I will mainly present some projects I have led for engineering phonon polaritons in van der Waals materials.

1. Configurable phonon polaritons in twisted α-MoO_3 (Twisting method)

2. Altering the reflection phase for nano-polaritons: a case study of hyperbolic surface polaritons in hexagonal boron nitride (Microstructuring method)

3. van der Waals isotope heterostructuring showcased in engineered light-matter waves (Isotope heterostructuring method)

4. Topological transition of phonon polaritons in hBN/calcite heterostructure and charge-transfer hyperbolic polaritons in α-MoO_3/graphene heterostructures (heterostructuring method)

Mingyuan Chen is currently a PhD candidate in Materials Engineering at Auburn University, specializing in 2D materials, Nanophotonics, Near-field optics, Nanofabrication, Electronic and Optoelectronic devices, and FEM simulation. His PhD research focuses on engineering light-matter interactions in van der Waals materials.

The public is welcome to attend. Information: Eva Ruff, emruff@umich.edu, 734-497-0748