Guided organic exciton-polaritons on patterned distributed Bragg reflectors at room temperature

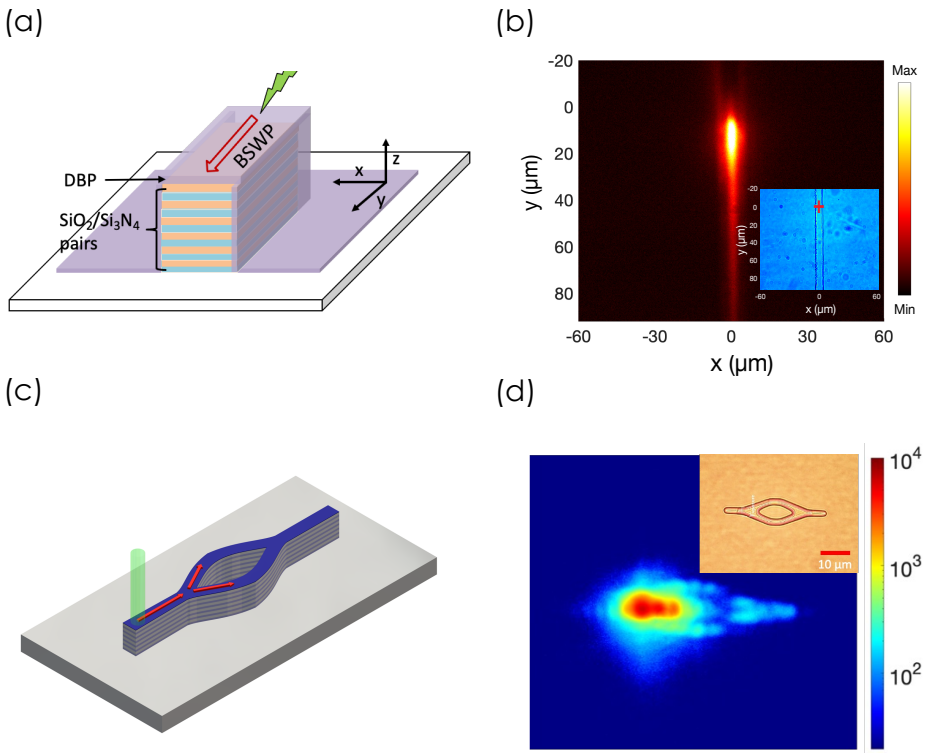

Figure: (a) Schematic of the guided polariton device consisting of a DBP film on the surface of a distributed Bragg reflector. (b) Real-space PL image from a guided polariton device. (c) Schematic of a polariton device with a Mach-Zehnder interferometric structure. (d) PL image in real space. Inset: microscope image of the device.

Objective

➢ To guide and manipulate the polariton flow in confined patterned structures for achieving device functionalities with all-optical control

Impact

Bloch surface wave polaritons (BSWPs) provide a promising platform for guiding and manipulating long-range energy transport, which is a hybrid light-matter state resulting from strong coupling between low-loss Bloch surface waves and excitons. Due to strong surface confinement and propagating nature, BSWPs can be guided by patterned photonic structures, sustain long-range coherence, and modulate intensity through polariton-polariton interaction.

Facilities and Methods Used

- Plasma Enhanced Chemical Vapor Deposition
- Photo and e-beam lithography
- Reactive ion etching
- Fourier-Plane Imaging Microscopy

Relevant Papers

- B. Liu, et Al., *ACS Photonics*, DOI: 10.1021/acsphotonics.3c01351

Funding

- US Army Research Office
- Universal Display Corporation

Contact

- Bin Liu (binliuqi@umich.edu)
- Jeffrey Horowitz (jeffhtz@umich.edu)

Optoelectronic Components and Materials Group **OCM**