UCLA College | Physical Sciences Chemistry & Biochemistry

Chem 218: Student Exit Seminar

Super-Resolution imaging of plasmonic Near-fields: Overcoming Emitter Mislocalizations

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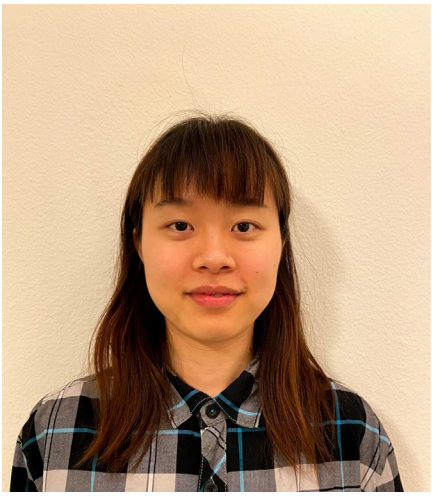
ABSTRACT: Plasmonic nano-objects have shown great potential in enhancing sensing, energy transfer and computing, and there has been much effort to optimize plasmonic systems and exploit their field enhancement properties. Super-resolution imaging with quantum dots (QDs) is a promising method to probe plasmonic near-fields. However, due to the strong coupling between QDs and plasmons, this technique is hindered by the formation of distorted point spread functions (PSFs) and QD mislocalizations. This talk investigates the coupling between QDs and 'L-shaped' gold nanostructures, and demonstrates both theoretically and experimentally that this strong coupling can induce polarization- / wavelength-dependent changes to the apparent QD emission intensity, polarization and position. From the magnitude and direction of the PSF shift under emission polarization modulation, the coupling strength can be extracted, and the true PSF location can be back-calculated from tabulated theoretical and experimental values. We will also discuss an open-source, modular super-resolution fluctuation imaging (SOFI) analysis package we built for both reconstructing super-resolved plasmonic near-fields and engaging the SOFI community with a wide range of applications. Our work provides a practical method with higher precision for plasmonic near-field mapping, which benefits many fields like biosensing and optical quantum computing.



Thursday, May 27th, 2021
12:00 p.m.
Via Zoom

For questions, please contact: jzabala@chem.ucla.edu