Perovskite and Plasmonic Nanophotonics and Optoelectronics

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Plasmonics have been recognized as a promising platform that may premise the performance enhancement of diverse optoelectronics. A comprehensive approach for the design and synthesis of multifunctional hybrid plasmonic nanomaterials has been systematically performed to seek their potential applications as key elements in green nano- and bio-technology,1-3 based on which target-oriented properties can be obtained by integrating plasmonic nanostructures into the elements of diverse multi-/inter-disciplinary studies. In this talk, I’ll introduce our recent activities with a special focus on the synthesis and applications of tailored plasmonic nanomaterials for optical (bio-)sensors, photovoltaic devices, photo-/electro-catalysts, and light-emitting materials

Very recently metal halide perovskites have been attractive as solar energy harvesters due to efficient ambipolar transport and strong light absorption. They have rapidly advanced thin film photovoltaic performance but the observed instabilities urgently require a solution. We report the reduced-dimensionality (quasi-2D) perovskite films that exhibit improved stability in solar cell performance while retaining the high performance of conventional three-dimensional perovskites. The quasi-2D perovskites have also shown promising features for the next generation LED that can replace existing OLED and QLED. We demonstrate that high performance visible light emitters can be developed by controlling over the structural and dimensional control.4-5 Lastly, combining the advance of plasmonic coupling and reduced-dimensionality perovskites, here we report plasmon-enhanced perovskites optoelectronic devices with a focus on thin-film photodectors and photovoltaic devices.

**References**

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