Design of Plasmonic Nanoparticle Lattices for Engineered Nanolasing

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Miniaturized lasers are important for applications ranging from display technologies to biological sensing to quantum optics. However, conventional laser cavities based on mirrors are limited in device size and lack the flexibility to control emission properties such as complex polarization, multi-directionality, and multi-colors. This talk describes how plasmonic nanoparticle lattices can be used as a powerful material platform to realize desired emission properties directly from compact laser sources. I will first introduce how we combine colloidal quantum dots with plasmonic nanoparticle lattices to achieve controlled lasing polarization and emission angles. Next, I will discuss how manipulation of lattice geometry and stacked lattice architecture allow simultaneous red, green, and blue lasing. Finally, I will show our discoveries of ultralong-range moirй lasing in the macroscale-separated bilayer and trilayer plasmonic lattices.

Short Bio:

Jun Guan is an assistant professor at the Chinese University of Hong Kong (Shenzhen). She obtained her bachelor's degree in physics from Sichuan University in 2016. As part of her undergraduate studies, she was a visiting student at the University of Oxford and the Hong Kong University of Science and Technology. She obtained her Ph.D. degree in applied physics at Northwestern University in 2021 under the supervision of Prof. Teri W. Odom and Prof. George C. Schatz. After graduation, she worked as a postdoctoral scholar at Northwestern University (2021-2022, advisor: Teri W. Odom) and then at the Massachusetts Institute of Technology (2022-2023, advisor: Vladimir Bulovi□). Jun Guan's research focuses on the design of plasmonic lattice architectures to manipulate light-matter interactions and to enable laser devices with diverse functionalities. She has published first-author papers in journals including *Nature*

Nanotechnology, *Chemical Reviews*, *Advanced Materials*, *ACS Nano*, and *Nano Letters.*