

学术讲座



同济大学
TONGJI UNIVERSITY

物理科学与工程学院
声子学与热能科学中心

报告人: Dr. Fengrui Hu

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时间: 12月24日 (周一), 下午1:30-2:30

地点: 物理馆512会议室



Nan-optical studies of 2D materials and semiconductor nanocrystals

报告摘要:

Intriguing optical properties in low dimensional materials attract great attention. In this talk, I will present our studies of polaritons in 2D materials and excitonic properties in single semiconductor nanocrystals (NCs).

Polaritons come from strong coupling of electromagnetic waves with an elementary excitation and show high confinement, leading to enhanced light-matter interaction. With scanning near-field optical microscopy, nano-optical imaging of exciton polaritons in MoSe₂ waveguides reveals interesting features like back-bending dispersion, long-distance propagation and thickness-dependent wavelength [Nat. Photonics 11, 356-360 (2017)]. Nanoimaging of twisted bilayer graphene uncovers twist angle dependent plasmon polaritons, which is attributed to Fermi velocity renormalization [Phys. Rev. Lett. 119, 247402 (2017)].

Semiconductor NCs consisting of hundreds to many thousands of atoms with a size of 1-10nm show novel excitonic properties due to quantum confinement effect. By combining single molecule spectroscopy with time resolved spectroscopy, we studied exciton dynamics in individual NCs. The unprecedented study of carrier multiplication (CM) in individual CdSe NCs unambiguously confirms highly efficient CM effect [Phys. Rev. Lett. 116, 106404 (2016)]. Single photon emission is observed in cesium lead halide perovskite NCs. High absorption cross section, short radiative lifetime, nonblinking and absence of spectral diffusion make perovskite NCs a competitive candidate for single photon source in future quantum information application [Nano Lett. 16, 6425-6430 (2016)].

个人简介:

Dr. Fengrui Hu received his Ph.D. degree from Nanjing University in 2015. Then he joined Prof. Zhe Fei's group at Iowa State University as a postdoc scholar for two years. Now he is a research associate in Prof. Baowen Li's group at University of Colorado, Boulder. His research interests include nanophotonics, ultra-fast spectroscopy, low dimensional materials and semiconductor-optics. So far, he has published 17 papers, including Nature Photonics, Physical Review Letters, Nature communications, Nano Letters, ACS Nano et al.

