ABSTRACT

Near-field nano-optics as a new and vibrant area of research has enabled the control and manipulation of electromagnetic radiations at the nano-meter length scales. In this talk, I will discuss recent nano-optical experiments on two-dimensional graphene/hexagonal boron nitride (G/hBN) van der Waals heterostructures. By harnessing infrared nano-optics we can directly image surface plasmon polaritonic standing waves and elucidate the intrinsic physics of graphene plasmonics [Nature (2018)]. The presence of periodic moiré patterns enables further fine tuning of the host materials and yielding rich insights into the electronic phenomenons. This has been manifested in both G/hBN moiré patterns [Nature Materials (2015)] and twisted bilayer graphene moiré structures [Science (2018)]. Furthermore, by examining the sub picosecond dynamics of plasmons in a unique set of pump-probe spectroscopy apparatus we were able to switch on plasmon on demand [Nature Photonics (2016)].