# Coupling between different polaritons in an in-plane graphene/h-BN heterostructure

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Abstract
The high-confined, dynamical tunable and intrinsic low damping graphene plasmon has important applications such as in enhanced IR spectroscopy [1-3], waveguide and modulator. Seamlessly connected in-plane graphene/h-BN heterostructure can further integrates the advantages of graphene plasmon and h-BN phonon polaritons [4]. The coupling between graphene plasmon and h-BN phonon polariton is studied using a full-wave electro-magnetic numerical model. The transmittance is determined by momentum matching, which can be controlled between 0% and 100% within the upper Reststrahlen band of the BN and be tuned using the graphene Fermi energy. This study paves a way to design nanoscale multi-functional waveguide devices in integrated photonic systems.

References

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Figures

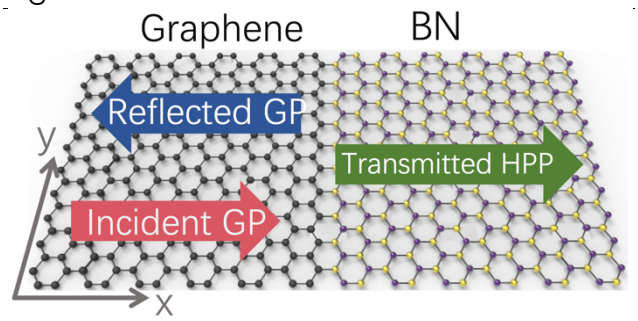


**Figure 1:** The Schematic of the in-plane graphene/h-BN heterostructure. The incident graphene plasmon (GP) can propagate forward until it encounters the interface, and then can transmit as hBN phonon polariton (HPP) or reflect.

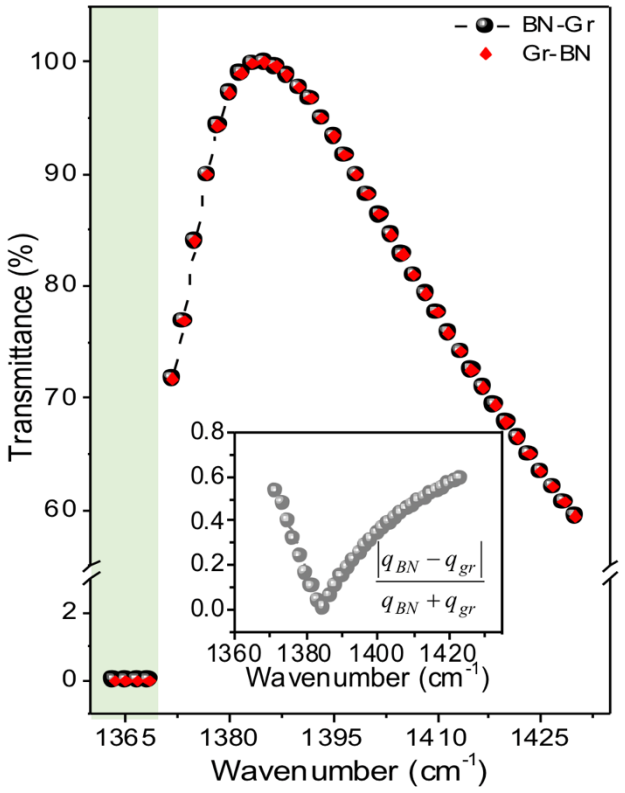


**Figure 2:** Transmission spectra of the GP and HPP at the interface. Inset: the momentum differences between a GP ($q_{gr}$) and HPP ($q_{BN}$) at different wavenumbers.