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Confined Plamons in graphene-graphene heterostructure DAN YOU, SLAVA ROTKIN, Lehigh Univ, XIAOJI XU COLLABORATION — Graphene, a two-dimensional network with honeycomb lattice, attracted great interest in electronics and optics. Surface Plasmon (SP) modes exist in graphene with stronger confinement and lower losses than in noble metals, which makes graphene a great promising material for RF. Response of confined graphene lake structure depends on both the geometry and the properties of underlying substrate. In narrow graphene nanostructure, such as graphene nano-disk, quantum effects become very important, so continuum plasmon modes are transformed into a discrete set of levels, quantized in angular and radial directions. Moreover, when combined with other materials, graphene SP exhibits hybridization, for example, with surface phonon polaritons, providing additional flexibility for fine tuning of composite plasmons. In our work, we investigate surface plasmon hybridization between small and an infinite monolayer graphene. We also consider the case of angular mismatched lattice of the disk and the monolayer. For this we introduce a scalar field of a moire pattern may induce periodic modulation in charge density and therefore in conductivity. We observe plasmon coupling between modes with different angular quantum numbers.

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