

Plasmons in nanographene and other atomic scale systems

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Abstract: We will review recent advances in the control and understanding of plasmons in systems that have atomic dimensions along one or more directions. In particular, we will discuss plasmons in graphene, carbon nanotubes, and fullerenes, as well as thin metal layers and molecules such as polycyclic aromatic hydrocarbons. A simple, powerful, analytical eigenmode expansion formalism will be reviewed in the electrostatic limit, along with tutorial examples of application to the understanding of plasmons in these systems, including the derivation of approximate expressions for the plasmon frequencies and wave functions. Intrinsic advantages of plasmons in atomic-scale systems will be also discussed, and in particular, their large electrical tunability, their strong nonlinear response, and the possibility of reaching quantum strong coupling.