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Plasmon Enhanced Raman Scattering in Ag-CdTe Core-Shell Nanostructures[1] SHENG WANG, DEXIONG LIU, JIANG ZENG, HUA ZHANG, DELIANG WANG, ZHENYU ZHANG, University of Science and Technology of China — Surface-enhanced Raman scattering (SERS) has been a powerful technique in investigating the properties of semiconductors. For semiconductor thin films, plasmon resonance and photoluminence (PL) are two important factors in determining the signal of SERS. Here we carry out a combined experimental and theoretical study of the optical properties of metal-semiconductor hybrid nanosystemes using SERS. First, we fabricate Ag-CdTe core-shell nanostructures by depositing CdTe on Ag nanoparticle arrays. By varying the thickness of the CdTe shell, one peak of plasmon is tuned to the wavelength of the incident light for resonant absorption, which is further verified by our finite-difference time-domain simulations. The coupling between the plasmons and excitons at the interface quenches the radiative PL process, while the non-radiative Raman scattering process is unaffected. Furthermore, the importance of multi-phonon resonance Raman scattering in these systems is investigated.

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