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Interparticle coupling effects of two quantum dots system on the transport properties of a single plasmon

Nam-Chol Kim and Myong-Chol Ko
Kim Il Sung University, Republic of Korea

Transport properties of a single plasmon interacting with two quantum dots (QDs) system coupled to one-dimensional surface plasmonic waveguide are investigated theoretically via the real-space approach. We mainly focus on the coupling effects of the two QDs on the scattering properties of a single incident plasmon. We demonstrated that switching of a single plasmon can be achieved by controlling the interparticle distance, the interparticle coupling strength and the QD-waveguide coupling strength, as well as spectral detuning. We also showed that the coupling between the continuum excitations and the discrete excitations results in the Fano-type transmission spectrum. The transport properties of a single plasmon interacting with such a two QDs system could find the applications in the design of plasmonic nanodevices, such as single photon switching, nanomirrors and in quantum information processing.

ryongnam10@yahoo.com