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The effect of electron-phonon interaction in artificial atoms within nanoscale YIMING MI, College of Fundamental Studies, Shanghai University of Engineering Science, SHUICHI IWATA, RACE, The University of Tokyo, MATERIALS SCIENCE TEAM, MATERIALS SCIENCE COLLABORATION — A model artificial atom containing two electronic states and several optical phonon modes is considered. The physical properties are studied by calculating the electronic Green's function and dielectric function of the artificial atom within non-perturbative approach. The calculated partial spectral densities of states , optical absorption and emission spectra of the artifical atoms under consideration are given explicitly for different physical parameters. It is shown that the inter-, intra-level interactions and multi-phonon processes are important in artificial atoms within nanoscale.

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