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Effect of Lattice Vibrations on DOS and Spectral Function in Auger and Tunneling Processes

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Abstract For the theoretical investigation of the effect of electron-phonon interaction on Auger and tunneling processes, we considered the Andersonlike Hamiltonian, which was developed by P.W. Anderson (1951-1961) to address one of the most challenging problems of 20th century physics. With suitable modifications, the powerful theoretical machinery which was invented to explain magnetic impurities in metals, could be used to predict the mixing of adsorbate electron on a metal surface. This Hamiltonian can be solved by equation of motion method of Zubarevs double time Green function of the adatoms self energy and DOS (Density of States) can be estimated. It was shown that the 4th order of the self energy contains the Auger process and can, therefore, contribute to the tunneling process. To calculate these from 1st principle, we investigated the effect of lattice vibrations following the Anderson model and found that both DOS and spectral function are modified with subsequent modification in the concerned surface parameters.

Keywords : Lattice vibrations, DOS, electron -phonon interaction, Auger and Tunneling processes, Anderson-like Hamiltonian, Adsorbate electron, Adatoms, Zubarev's double time Green function.
