ELECTRON-PHONON INTERACTION IN A SEMICONDUCTOR QUANTUM WIRE EMBEDDED INTO THE SEMICONDUCTOR MEDIUM

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S u m m a r y

The renormalization of electron ground state energy due to the different types of interaction with confined (L) and interface (I) phonons in a semiconductor cylindrical quantum wire (QW) embedded into the semiconductor medium by the example of a HgS/CdS nanosystem. It is shown that, for rather big sizes of a QW, the shift Δ of the ground energy is mainly caused by the interaction between an electron and confined phonons of the wire and the medium. The contribution of interface phonons (I^+, I^-) into the magnitude of shift is essentially bigger (one-two orders) that the contribution of L-phonons for small sizes of a quantum wire. For all sizes of a QW, the interaction with all phonons through the states of the continuous spectrum makes a contribution into the shift Δ by several times smaller than the interaction through the states of discrete spectrum. When the QW radius increases, the contribution of I-phonons decreases and that of L-phonons – increases. Consequently, the shift reaches its magnitude in a massive crystal.