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Title

Phonon Effects on Electric and Thermal Properties in a Single Electron Transistor

Source

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Abstract

We investigate the effects on the transport characteristics of a single electron transistor caused by dynamic deformations of the device configuration due to phonons. We formulate the electron-phonon interaction that originates from changes in capacitances and tunnel resistances caused by the breathing and oblong vibrations of the island that forms part of the transistor. We derive transport properties by means of the master equation. For a single electron transistor with a gold nanoparticle island with a radius of 1 nm, we demonstrate the contribution to the transport properties that originates from tunneling channels associated with THz phonon emission and absorption. (14 References).