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Bandgap enhancement of phonon occupation LUTFE SIDDIQUI, NSF Network for Computational Nanotechnology, Purdue University, West Lafayette, IN 47907, AVIK GHOSH, Department of Electrical and Computer Engineering, University of Virginia, Charlottesville, VA 22903, SUPRIYO DATTA, NSF Network for Computational Nanotechnology, Purdue University, West Lafayette, IN 47907 — We explore the effect of electron transport through a vibration-coupled quantum dot weakly coupled with semiconducting leads and the thermal environment by writing master equations in the electron-phonon fock space. We show that the presence of bandgap in the semiconducting leads results in an enhancement of phonon occupation compared to the case of metallic contacts under certain bias as different phonon absorption processes get shut off by the bandgap. We also show that the presence of bandgap can lead to more than one negative differential resistance (NDR) peaks in the conductance spectrum of the dot.

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