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Properties of polar optical phonons in wurtzite quantum dots
VLADIMIR A. FONOBEROV, ALEXANDER A. BALANDIN, Nano-Device Laboratory (http://ndl.ee.ucr.edu/), Department of Electrical Engineering, University of California, Riverside, CA 92521 — Wurtzite (WZ) ZnO and GaN quantum dots (QDs) have attracted significant attention as promising candidates for optoelectronic applications. To enable the interpretation of the optical response of such QDs, we derive an integral equation that defines both interface and confined polar optical phonon modes in WZ QDs of arbitrary shapes [1]. The analytical solution of the derived equation is found for spheroidal QDs [2]. While the frequency of the confined polar optical phonons in zincblende QDs is equal to that of the bulk crystal, the confined optical phonons in WZ QDs are shown to have a discrete spectrum of frequencies different from those of the bulk crystal. The obtained results have been proven useful for the accurate prediction of interface and confined optical phonon frequencies in the novel class of QDs. This research has been supported in part by the ONR Young Investigator Award to A.A.B. [1] V.A. Fonoberov and A.A. Balandin, Phys. Rev. B 70, in press (Dec. 15, 2004). [2] V.A. Fonoberov and A.A. Balandin, Phys. Stat. Solidi C 1, 2650 (2004).

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