Abstract Submitted
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Thermoelectric energy harvester based on quantum well superlattices YUNJIN CHOI, ANDREW JORDAN, University of Rochester — We propose a nanoscale heat engine based on quantum well superlattices for harvesting thermal energy. A hot cavity is connected via superlattices to electronic reservoirs, and the electron transport through the superlattice by gaining energy from the hot cavity converts heat into electrical power. The energy gain is determined by the composite superlattices system. Therefore, the electric and heat current of electrons for simplified miniband transport of the superlattices give tunable conditions for the maximal generated power or efficiency. In addition, we analyze the phonon transport through the superlattices and show the reduction of the phonon thermal conductivity at high temperature which is beneficial for the highly efficient thermoelectric devices [1]. Combination of the electron and phonon transport shows an optimal configuration for the best performance of energy harvester. We discuss and compare our result with the energy harvester based on resonant quantum wells [2].

[1] M. V. Simkin and G. D. Mahan, Phys. Rev. Lett. **84**, 927 (2000).
[2] B. Sothmann, R. Sánchez, A. N. Jordan, and M. Büttiker, New J. Phys. **15**, 095021 (2013).

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