

Abstract Submitted
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Controlling electron-phonon scattering with metamaterial plasmonic structures KRZYSZTOF KEMPA, XUEYUAN WU, JIANTAO KONG, DAVID BROIDO, Boston College — Electron-plasmon scattering can be faster than electron-phonon scattering. While in metals plasmons occur in the UV range, phonons dominate behavior at much lower frequencies (far IR range), and this typically decouples these phenomena. In metamaterial plasmonic structures, however, plasma effects can be tuned down to the far IR range, allowing for their interference with phonons. It was recently shown, that such interference can protect hot electron energy induced in a solar cell, from dissipation into heat [1]. In this work we explore the possibility of using such an effect to control the electron-phonon interaction and transport in semiconductors. We demonstrate, that this could lead to a novel path to enhancing the electrical and thermal conductivities and the thermoelectric figure of merit. [1] Hot electron plasmon-protected solar cell, J. Kong, A.H. Rose, C. Yang, J. M. Merlo, M.J. Burns, M. Naughton, and K. Kempa, Opt. Express 23, A1087-A1095 (2015) doi:10.1364/OE.23.0A1087

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