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Electron-phonon coupling in semiconductors and their nanostructures: effect on transport properties JELENA SJAKSTE, PAOLA GAVA, NATHALIE VAST, Ecole Polytechnique, Laboratoire des Solides Irradiés, CEA-DSM-DRECAM, CNRS, 91128 Palaiseau, France, VALERIY TYUTEREV, Tomsk State Pedagogical University, Tomks, Russia — Parameter-free description of the electron-phonon coupling is crucial for the simulation of the electron and thermal transport in materials, especially nanostructured ones. Recently, we have developed an *ab initio* approach which allows to calculate the electron-phonon constants and scattering times for collisions of carriers in the conduction band with short-wavelength phonons [1,2]. We will present our results on the electron-short-wavelength phonon interaction in silicon, which enables us, on one hand, to shed new light on the transitions between shallow donor levels in doped Si [2], and, on the other hand, to improve the description of its electronic mobility [3]. Finally, we will discuss the effect of the material nanostructuring on the electron-phonon coupling constants, e.g. in semiconducting superlattices.

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