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Concentration dependence of the electron-phonon coupling from metals to semiconductors ANDREI SERGEEV, MICHAEL REIZER, VLADIMIR MITIN, SUNY at Buffalo — We study dependence of the deformation potential (DP) on concentration of carriers in the wide range from metals to semiconductors. DP in metals and semiconductors has a different nature. In metals, DP is due to electron gas compressibility, while in semiconductors this contribution is negligible due to small carrier concentrations. DP in semiconductors originates from a shift of the conduction band edge under the deformation, while in metals such contribution is small because of strong screening. We investigate DP in the transition region and found that the electron-phonon coupling has a significant minimum at intermediate concentrations. The effects of disorder on the coupling are also investigated. Theoretical conclusions are compared with available data on semi-metals and highly-doped semiconductors.

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