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Role of phonon-assisted processes in Auger recombination in InAs JIMMY-XUAN SHEN, DANIEL STEIAUF, ANDERSON JANOTTI, CHRIS G. VAN DE WALLE, Univ of California - Santa Barbara — Auger recombination has been identified as an important loss mechanism in InAs and InAs-alloy based light emitters, yet the mechanisms are not fully understood. In particular, it is unclear whether direct or indirect processes dominate. The direct process involves only Coulomb interaction, while the indirect process is mediated by the absorption or emission of a phonon. We present results of first-principles calculations of the direct and indirect phonon-assisted Auger coefficients in InAs and related alloys. The direct process is usually assumed to dominate in small-band-gap semiconductors. However, we find that indirect phonon-assisted processes also contribute significantly to the Auger rate. We untangle the contributions of the electron-electron-hole and holehole-electron processes, and pinpoint the phonon modes that are most relevant to the indirect process.

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