

Abstract Submitted
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Infrared photodetector based on modulation-doped quantum-dot structures¹ NIZAMI VAGIDOV, University at Buffalo, ANDREI SERGEEV, University at Buffalo, VLADIMIR MITIN, University at Buffalo — We investigate a device model for the quantum-dot photodetector based on modulation-doped structures (for example, the modulation-doped AlGaAs/GaAs structure with InAs quantum dots). At room temperatures, the electron momentum relaxation is determined by electron-phonon scattering. The electron mean free path is small and the photoelectron capture is conditioned by electron diffusion in the potential relief created by modulation doping. Modeling with diffusion-limited capture is used to evaluate the photodetector performance. The results show that the modulation-doped structures provide longer lifetimes of photoelectrons, which in turn improves the photoconductive gain and sensitivity.

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