

Calculation of characteristics of Ge/Si avalanche photodiodes with an array of nanoholes for an atmospheric communication channel

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This work evaluates the parameters of Ge/Si avalanche photodiodes (Ge/Si APDs) with nanoholes for photon trapping at 850 nm. The proposed design of a Ge/Si avalanche photodiode with photon traps allows for significant increases in gain, bandwidth, and absorption efficiency. It has been demonstrated that it is possible to improve the absorption efficiency of the photodetector without compromising the gain and speed of the device. The results of the work can be used to design Ge/Si avalanche photodiodes using trap structures with high gain, speed and absorption efficiency in advanced technologies, such as fluorescence lifetime imaging microscopy, positron emission tomography, quantum communication systems, and lidar technologies.

Keywords: avalanche photodiode, infrared photodetectors, gain, bandwidth, nanostructures.

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