

## Single-photon avalanche diode detectors based on group IV nanostructures

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Two-dimensional materials (quantum wells and graphene-like 2D crystals) as well as arrays of zero-dimensional quantum dots have attracted much attention of researchers. For example, quantum dots ensembles and multi-layer structures are widely used for creation of photodetectors, solar cells and light-emitting devices [1]. In Its turn, unique properties of graphene-like 2D materials make it possible to create on their basis devices of a new generation: topological transistors, high-sensitive gas sensors, energy-intensive sources of power, thermoelectric generators, quantum computers [2].

Development of single-photon detectors based on nanostructures is another emerging and very perspective area of application of these structures [3]. Creation of these devices is crucial for the modern photonics, fiber optics and quantum communication technologies. Improvement of the technology of fabrication of solid-state avalanche photodiodes using epitaxial methods have proved their wide opportunities for operation at ambient conditions.

In this work we report on recent progress in the synthesis and implementation of single-photon avalanche diode detectors based on group IV nanostructures and technological possibilities of improvement of their operating characteristics.

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