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Organic solutions and nanoparticles composite semiconductor compounds intended for infrared detection

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The paper reviews some photosensitive materials and semiconductor compounds based on composite organic solutions and nanoparticles, including two or more semiconductor materials in a mixed active layer, namely: Colloidal Quantum Dots (CQDs), Perovskites, Organic semiconductors, Nanoparticles and Grafen layers. The structural configurations of devices and possible charge carrier transfer schemes in perovskites have been presented. Charge carrier distribution schemes in composite layers based on organic semiconductor compounds and nanoparticles have been shown.

New materials allow the use of advanced concepts of IR detection systems, including pixel-free integration with the readout integration circuits, various photosignal amplification mechanisms, lightweight designs, and an operation at increased temperatures. The perspectives of advanced implementation in next-generation infrared sensing have been presented.

Keywords: organic semiconductors (OSCs), perovskites, nanoparticles (NPs), colloidal quantum dots (CQDs), IR photodetector.

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