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Photoconductivity of GeSn alloys

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Germanium tin (GeSn) semiconductors are promising absorber/emission materials for the novel infrared (IR) optoelectronic devices. The main advantage of these materials is the possibility to obtain a higher absorptivity in comparison with indirect-bandgap crystalline silicon, germanium, and their alloys. The GeSn/Ge/Si heterostructures were grown by a chemical vapor deposition method. An intermediate 700 nm thick Ge buffer layer was grown on a boron-doped Si (001) substrate by a two-step growth method to minimize the lattice mismatch between the GeSn epilayer and the Si substrate. The lateral photoconductivity spectral dependencies of GeSn alloy with various content Sn in the 0% <x <20% range were studied at 80-300 K temperatures. The values of the direct and indirect bandgaps were determined by fitting spectral dependencies near the absorption edge. The photosensitivity and carrier lifetimes of the GeSn-based photoresistors of various Sn content were analyzed to propose a mechanism of photoconductivity of GeSn thin films.

Topics

Session A. Physics of condensed matter and spectroscopy

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