

Laser Irradiated GeSn Photodetector for Improved Infrared Photodetection

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Abstract : In this study, we focused on the optoelectronic properties of the photodiodes prepared by using 200 nm thick $\text{Ge}_{0.95}\text{Sn}_{0.05}$ epitaxial layers on Ge/n-Si substrate with aluminum contacts. Photodiodes were formed on non-irradiated and Nd: YAG laser irradiated $\text{Ge}_{0.95}\text{Sn}_{0.05}$ layers. The samples were irradiated by pulsed Nd: YAG laser with 136.7-462.6 MW/cm² intensity. The photodiodes were characterized by using short laser pulses with the wavelength in the 2.0-2.6 μm range. The laser-irradiated diode was found more sensitive in the long-wavelength range due to laser-induced Sn atoms redistribution providing formation of graded bandgap structure. Sub-millisecond photocurrent relaxation in the diodes revealed their suitability for image sensors. Our findings open the perspective for improving the photo-sensitivity of GeSn alloys in the mid-infrared by pulsed laser processing.

Keywords : GeSn, laser processing, photodetector, infrared

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