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n-Type β-$FeSi_2$/p-Type Si Hererojuncion Photodiodes Fabricated by Facing Targets Direct-Current Sputtering SHOTA IZUMI, Kyushu University, NATHAPORN PROMROS, Kyushu Universiy, MAHMOUD SHABAN, South Valley University , TSUYOSHI YOSHITAKE, Kyushu University — Semiconducting iron disilicide (β-$Fesi_2$) has been received much attention, since this material has several attractive characteristics. Specifically, it is a new candidate material for near-infrared (NIR) photodetectors for optical fiber communication because its optical band gap is optimum for operating at wavelengths of 1.3 and 1.55 μm. In this study, β-$FeSi_2$ thin films were epitaxially grown on Si(111) substrates by facing targets direct-current sputtering (FTDCS) at a substrate-temperature of 600°C without post-annealing at a high temperature. In the dark and under illumination at a wavelength of 1.31μm, the photodiode performance was measured in the temperature range from 50 to 300 K. At a low temperature, the performances were remarkably improved as compared with those at 300 K. The R_0A product and detectivity at 50 K were estimated to be 2.0×10^8 Ω cm^2 and 2.8×10^{11}cm·Hz$^{1/2}$/W, respectively.

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