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Abstract

Exploration of impurity elements for carrier density control is important for device application of the $BaSi_2$ semiconductor, which is a promising candidate for an earth-abundant solar cell absorber. In this study, we have investigated the doping of $BaSi_2$ films with alkali metals (Li, Na, and K) by deposition of alkali-metal fluorides followed by rapid thermal annealing. Electrical characterization by Hall measurement shows that LiF treatment increases electron density in $BaSi_2$ up to 10^{20} cm^{-3} after annealing at 500 °C while NaF and KF treatments have limited effects with electron densities lower than 10^{18} cm^{-3}. The mechanisms of electrical property modification are discussed from structural viewpoints. Secondary ion mass spectroscopy shows that Li atoms slightly diffuse into the film at 400 °C by prolonged

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