

Abstract Submitted  
for the GEC10 Meeting of  
The American Physical Society

**Preparation of n-Type  $\beta$ -FeSi<sub>2</sub>/p-Type Si Heterojunctions for Near-Infrared Photodetectors by Pulsed Laser Deposition** NATHAPORN PROMROS, CHEN LI, WATARU YOKOYAMA, TSUYOSHI YOSHITAKE, Kyushu University, KYUSHU UNIVERSITY TEAM — Semiconducting  $\beta$ -FeSi<sub>2</sub> has attracted much attention owing to its attractive properties.  $\beta$ -FeSi<sub>2</sub> thin films have been fabricated by various methods. On the other hand, there have been few researches employing pulsed laser deposition (PLD), although it appears to be suitable for growing  $\beta$ -FeSi<sub>2</sub> films due to the following features: i) in order to suppress the diffusion of Fe atoms into Si substrates, deposition at a low substrate-temperature is preferable. PLD makes possible low temperature growth due to highly energetic species; ii) the chemical composition between the target and film is hardly changed in PLD. By using a sintered FeSi<sub>2</sub> target,  $\beta$ -FeSi<sub>2</sub> films expected to be as-grown on Si. In this study,  $\beta$ -FeSi<sub>2</sub> films were grown on Si(111) substrates at a substrate-temperature of 600 °C by PLD without post-annealing. The epitaxial relationships between the  $\beta$ -FeSi<sub>2</sub> film and Si(111) substrate were examined by X-ray diffraction (XRD). Several types of crystalline orientations co-existed in the film. The  $\beta$ -FeSi<sub>2</sub> film exhibited n-type conduction without doping, which might be due to Co and Ni impurities in the target that act as a donor in  $\beta$ -FeSi<sub>2</sub>. Dark  $I-V$  characteristics of the heterojunction showed a rectifying behavior. The photocurrent for irradiation with a 1.31- $\mu$ m laser was low.

Nathaporn Promros  
Kyushu University

Date submitted: 11 Jun 2010

Electronic form version 1.4