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## Growth and characterization of Mg-doped *p-i-n* solar cell structure with InGaAs/GaAs multi-quantum well

Sookhyun Hwang, Yonkil Jeong, Hoonha Jeon, Jewon Lee, Jae-Young Leem and Minhyon Jeon\*

Department of Broadband information and communication,

\*Institute for Nanotechnology Applications, Inje University,

Gimhae-shi, Kyungnam, 621-749, Korea (ROK),

We investigated the optical and electrical characterizations of Mg-doped *p-i-n* solar cell with InGaAs/GaAs multi-quantum well (MQW). A simple Mg-doped *p-n* junction (SC1) was grown on  $n^+$ -GaAs substrate by molecular beam epitaxial (MBE) system. Another cell structure (SC2) was composed of five periods InGaAs/GaAs MQW for the absorption layer on top of GaAs buffer grown on  $n$ -GaAs substrate. The top of the structures was covered with a thin AlGaAs layer as a window layer. Based on our experiment results and computed values, the activation energy of Mg dopant and the crystalline quality of MQW layers were analyzed. Especially, it is remarkable that Mg-doped *p-i-n* solar cell structure increased both short circuit current ( $I_{sc}$ ) and open circuit voltage ( $V_{oc}$ ) compared to a simple *p-n* junction even if the fill factor was drastically dropped.

Keywords: MBE, MQW, Mg, Solar cell, DXRD, Photoluminescence, Photoreflectance, TEM.