

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Crystalline ordered states and local surface potential variations of photovoltaic Cu(In,Ga)Se<sub>2</sub> thin-films<sup>1</sup>** A.R. JEONG, R.H. SHIN, WILLIAM JO, Ewha Womans University — Structural and electrical properties of CuInSe<sub>2</sub>(CIS), Cu(In,Ga)Se<sub>2</sub> (CIGS) and CuGaSe<sub>2</sub> (CGS) grown by co-evaporation were studied. Intriguing morphology and grain growth behaviors were found in the surface of the films. X-ray diffraction of the films exhibited phase formation of the stoichiometric chalcopyrite while Cu<sub>2</sub>Se and CuSe<sub>2</sub> were observed. Using Raman scattering spectroscopy, shift of A<sub>1</sub> mode was observed from 177 cm<sup>-1</sup> for CIS to 189 cm<sup>-1</sup> for CGS as Ga content increased. It is very interesting that two different crystalline ordered states with chalcopyrite (CH) and CuAu structure (CA) were found. Effects of the grain boundaries on local electrical properties of the films with different chemical contents were examined. Local current mapping and surface potential distribution were obtained in the film by conductive atomic force microscopy and Kelvin probe microscopy. Minority carrier transport behaviors and local variations of potential values on and near the grain boundaries were characterized. These results suggested that a local built-in potential is possibly formed on positively charged grain boundaries.

<sup>1</sup>Support from the General R/D Program of DGIST, funded by MEST of the Republic of Korea.

William Jo  
Ewha Womans University

Date submitted: 16 Dec 2010

Electronic form version 1.4