

Sociedad Mexicana de Ciencia y Tecnología de Superficies y Materiales A.C.

VIII International Conference on Surfaces, Materials and Vacuum

September 21st – 25th, 2015 Puebla, Puebla

[SEM-98] Nanoelectric and photovoltaic characterization of CuInSe₂ films doped with active metals

L.E. Arvizu-Rodríguez (liliarvizurdz@gmail.com) 4 , A. Barón-Miranda 6 , F. Caballero-Briones (felipecaballerobriones@gmail.com) 6 , S. JiménezSandoval 2 , I. Díez-Pérez 3 , L. Aguilera-Vázquez 4 , U. Páramo-García 4 , F. Sanz 5 , F. Sanz 1 , F. Sanz 3 , F. Chalé-Lara 6

1 CIBER-BBN, Campus Río Ebro Edificio I+D, Bloque 5, 1a planta, C/Poeta Mariano Esquillor s/n, 50018 Spain . 2 CINVESTAV-IPN Unidad Querétaro, Libramiento Norponiente, Fracc. Real de Juriquilla, Juriquilla, México. 3 Departament de Química Física, Universitat de Barcelona, Martí i Franquès 1, 08028, Barcelona, Spain. 4 División de Estudios de Posgrado e Investigación, Instituto Tecnológico de Cd. Madero, Tamaulipas, Mexico. 5 Institute for Bioengineering of Catalonia (IBEC), Edifici Hèlix, Baldiri i Reixac 15-21, 08028 Barcelona, Spain. 6 Instituto Politécnico Nacional, Laboratorio de Materiales Fotovoltaicos, CICATA Altamira. Km 14.5 Carretera Tampico-Puerto Industrial Altamira. 89600 Altamira, México.

Investigation has been made as to the incorporation of electrically beneficial for CuInSe₂ impurities, such as with sodium doping. It has been found that the grain boundaries of the CIS not create deep levels and therefore are neutral. However, they have not tested other active dopants that could improve the performance observed with sodium. In this work they were electrodeposited CuInSe₂ the films on copper substrates using a bathroom with Cu ratios: Se: In 1: 1: 2. To increase crystallinity and reducer the presence of phases undesirable as Cu-Se or Se films electrochemical post-treatment were carried to the films applying a negative potential in the presence of Se⁴⁺ and subsequently a potential positive in the same solution[1]. The films were doped with four electrochemically active metals at three different levels of doping, applying an additional negative potential during deposition. The films were characterized by Raman spectroscopy, atomic force microscopy with current measurement (CAFM), IV macro with light without light and photoelectrochemical current. IV curves and electrical CAFM images by finding an improved rectifying behavior of current with decreasing charge density of the dopant and local variations in conductivity of the materials are compared. The effect of doping on the microstructure and photocurrent measurements and electrochemical photocurrent described. [1] F. Caballero-Briones, L.E. Arvizu-Rodríguez, A. Palacios-Adrós, S. Jiménez-Sandoval, F. Chalé- Lara, J.L. Fernández-Muñoz, I. Díez-Pérez, F. Sanz, F.J Espinosa-Faller, Phase and surface modification by electrochemical post deposition treatments in ultrasonic-assisted CuInSe₂/Cu electrodeposited films properties. Sent: Chalcogenide Letters.