Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Supporting information

A Hybrid Ink of Binary Copper Sulfide Nanoparticles and Indium Precursor Solution for a Dense $CuInSe_2$ Absorber Thin Film and its Photovoltaic Performance

Ara Cho, SeJin Ahn, Jae Ho Yun, Jihye Gwak, Hyunjoon Song, and Kyunghoon Yoon

Ref. 17) A. Cho, S. J. Ahn, J. H. Yun, J. Gwak, S. K. Ahn, K. Shin, H. Song and K. Yoon, *Sol. Energy Mater. Sol. Cells* **2012**, submitted.

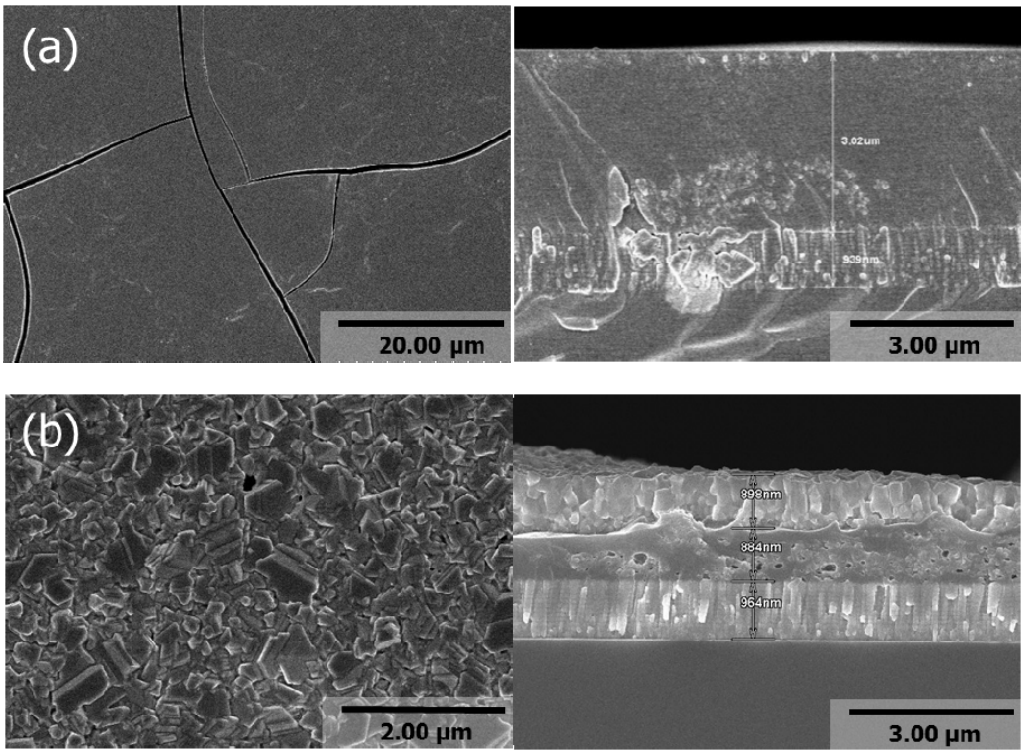

Figure S1. Planar and cross-sectional SEM images of the hybrid thin films using $Cu_{2-x}Se$ nanoparticles and In precursor solution. (a) as-deposited films and (b) selenized films at 530 ºC for 60 min with a 100 Å/s of Se deposition rate.

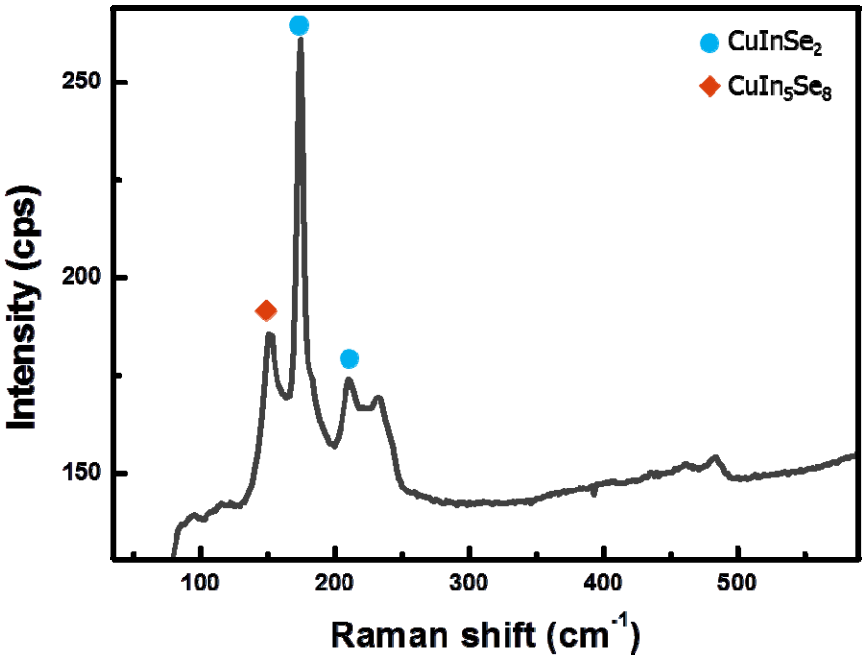

Figure S2. Raman spectrum of selenized thin film at 530 ºC for 60 min with 100 Å/s of Se deposition rate using hybrid ink of $Cu_{2-x}Se$ nanoparticles and In precursor solution.

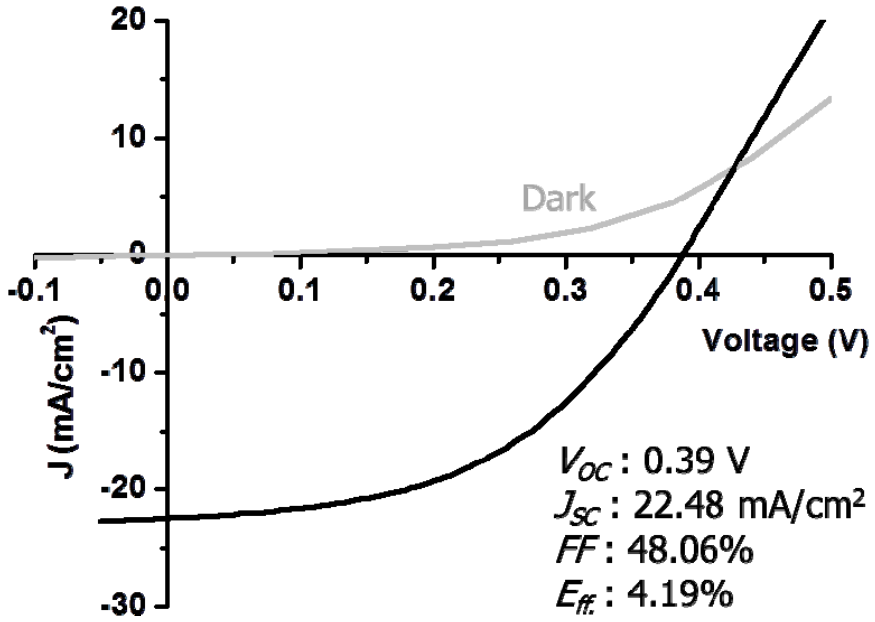

Figure S3. Light and dark *J-V* characteristics of the fabricated cell (Area = 0.4848 cm^2) using the hybrid ink of $Cu_{2-x}Se$ nanoparticles and In precursor solution. Light illuminated *J-V* was measured by using a class AAA solar simulator (AM 1.5G, 100 mW/cm^2) at 25 ºC.

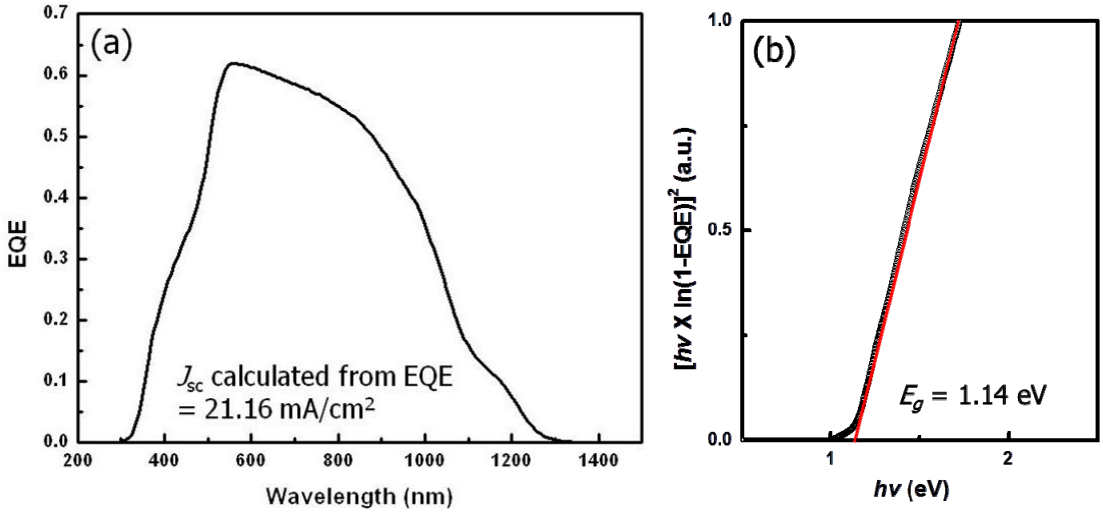

Figure S4. The characteristics of the fabricated cell using the hybrid ink of $Cu_{2-x}Se$ nanoparticles and In precursor solution. (a) EQE curve and (b) determination of band gap from the [$h\nu$ x ln(1-EQE)]^2 vs. $h\nu$ relation.