

Abstract Submitted
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Nano-scale Characteristics of Copper poor ordered defect compound at grain boundary of CuInGaSe₂ YAPING MA, Chinese Univ of Hong Kong — This work investigates the copper poor ordered defect compound (ODC) layer at grain boundaries (GB) for Cu_x(Ga_{0.3}In_{0.7})Se₂ with different Cu composition ratio ($x = 0.9$ and 0.68). Same chemical composition while widened ODC layer at GBs with lower Cu ratio were first reported determined by the energy dispersive spectroscopy in scanning transmission microscopy mode. Band structure of the ODC layer was directly measured by scanning tunneling spectroscopy showing a downward offset for conduction band and valance band of 200 eV and 350 eV, respectively. This result was further confirmed by photocurrent accumulation and higher schottky barrier at GBs measured by the conducting probe atomic force microscopy (CP-AFM). Local photovoltaic performance measurements of individual grain boundaries with different ODC width were investigated, using CP-AFM and the disappearance of the differences of open circuit voltage and shunt resistance between grain interior and grain boundary at low illumination provides a direct evidence for the reduced recombination at widened ODC grain boundary which greatly supports the hole barrier theory for the high efficiency of the Copper Indium Ga Selenide solar cells.

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