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Fabrication of nanostructured CIGS solar cells[1] HONGWANG ZHANG, Department of Physics, University at Buffalo-SUNY, FANG WANG, Shanxi Normal University & University at Buffalo-SUNY, JAMES PARRY, SAMANTHE PERERA, HAO ZENG, Department of Physics, University at Buffalo-SUNY — We present the work on $Cu(In,Ga)(Se,S)_2$ based nanostructured solar cells based on nanowire arrays. CIGS as the light absorber for thin-film solar cells has been widely studied recently, due to its high absorption coefficient, long-term stability, and low-cost of fabrication. Recently, solution phase processed CIGS thin film solar cells attracted great attention due to their extremely low fabrication cost. However, the performance is lower than vacuum based thin films possibly due to higher density of defects and lower carrier mobility. On the other hand, one dimensional ordered nanostructures such as nanowires and nanorods can be used to make redial junction solar cells, where the orthogonality between light absorption and charge carrier separation can lead to enhanced PV performance. Since the charge carriers only need to traverse a short distance in the radial direction before they are separated at the heterojunction interface, the radial junction scheme can be more defect tolerant than their planar junction scheme. In this work, a wide band gap nanowire or nanotube array such as TiO_2 is used as a scaffold where CIGS is conformally coated using solution phase to obtain a radial heterojunction solar cell. Their performance is compared that of the planar thin film solar cells fabricated with the same materials.

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