

CNTs Electric Field Enhancement of CIGS Solar Cells

한성환

한양대학교

Compound semiconductor/CNTs composites have shown considerably improved efficiency improvement in photovoltaic devices, which is often attributed to two different factors. One is the formation of efficient electronic energy cascade structures. The other effect of CNTs on the performance of photovoltaic devices is the decrement of interfacial resistance. The interfacial resistances at n-type/ p-type materials and/or n-type materials/TCO electrode are reduced by an outstanding electrical property of CNTs.

In addition to the effects of CNTs, we report the third reason for increment of efficiency in photovoltaic devices by CNT's well-known electrical field enhancement effects. The improved β values in reverse-FE currents of CIGS electrode with SWNTs layers indicate the enhancement of electrical field in photovoltaic devices, which implies the acceleration of the electron transfer rate in the cell. Due to the formation of an efficient electronic energy cascade structure and the decrease of the interfacial resistance as well as the improvement of the electrical field in the photovoltaic devices, the power conversion efficiency of electrochemically deposited superstrate-type CIGS solar cells was increased 24.3% in the presence of SWNTs and showed 10.40% conversion efficiency.