SA-1

Electrochemical Synthesis of Compound Semiconductor Photovoltaic Materials

유봉영†, 전병준, 이동규

한양대학교 재료공학과
(byyoo@hanyang.ac.kr†)

As one of the non-vacuum, low temperature fabrication route, electrochemical synthesis has been focused for pursuing the cost-effective pathway to produce high efficiency photovoltaic devices. Especially the availability to form the thin film structure on flexible substrate would be the great advantage of electrochemical process. The successful synthesis of the most favorable absorber materials such as CdTe and CIGS has been reported by many researchers, however, the efficiency of electrochemically synthesized could not exceed that from vacuum process, because of microstructural controllability and compositional variation on devices. In this study, we represent the effect of process parameters on the microstructure and composition of compound semiconductor during the synthesis, and propose the photovoltaic characteristics of electrochemically synthesized solar cells.

Keywords: CIGS, electrodeposition

SA-2

Electrical and Optical Characterizations of Metal/Semiconductor Contacts for Photovoltaic Applications

김동욱†

이화여자대학교 물리학과 및 나노과학부
(dwkim@ewha.ac.kr†)

Photovoltaic devices are promising candidates as affordable and large-area renewable energy sources, which can replace the fossil-fuel-based resources. Especially, thin film solar cells have attracted increasing research attention, since they have a great advantage of low production cost. From the physical point of view, the photovoltaic devices can provide us interesting questions, how to enhance the light absorption and the carrier collection efficiency. A lot of approaches would be possible to address these issues. We have focused on two major topics relevant to photovoltaic device physics; (1) light management using surface plasmons and (2) junction characterizations aiming at proper interface engineering.

Regarding the first topic, we have investigated the influences of Ag under-layer morphology on optical properties of ZnO thin films. The experimental results suggested that coupling between the surface plasmon polaritons at the ZnO/Ag interface and excitons in ZnO should play important roles in reflectivity of the ZnO/Ag thin films, which are widely used back reflector structures in thin film solar cells. For the second topic, we have carried out scanning probe microscopy studies of Schottky junctions consisting of photovoltaic materials. Such a research is very helpful to understand the correlation between the defects (e.g., grain boundaries) and local electrical properties. We will introduce some of the recent experimental results and discuss the physical significance.

Keywords: photovoltaic, plasmon, junction