Photoelectrochemical characterization of surface-modified CuInS2 nanorod arrays prepared via template-assisted growth and transfer

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Although vertically aligned one-dimensional (1D) structure has been considered as efficient forms for photocathode, development of efficient 1D nanostructured photocathode are still required. In this sense, we recently demonstrated a simple fabrication route for CuInS2 (CIS) nanorod arrays from aqueous solution by template-assisted growth-and-transfer method and their feasibility as a photocathode for water splitting. In this study, we further evaluated the photoelectrochemical properties surface-modified CIS nanorod arrays. Surface modification with CdS and ZnS was performed by successive ion layer adsorption and reaction (SILAR) method, which is well known as suitable technique for conformal coating throughout nanoporous structure. With surface modification of CdS and ZnS, both photoelectrochemical performance and stability of CuInS2 nanorod arrays were improved by shifting of the flat-band potential, which was analyzed both onset potential and Mott-Schottky plot.

Keywords: Photoelectrochemical water splitting, AAO template, CuInS2, nanorod array