Fabrication of CdS/CdSe multilayer films by electrodeposition method

Chun-lin Lu\textsuperscript{a}, Lin Zhang\textsuperscript{a,b}, Yun-wang Zhang\textsuperscript{a}, Guang-xin Liu\textsuperscript{a,c}

\textsuperscript{a} Science and Technology on Plasma Physics Laboratory, Research Center of Laser Fusion, China Academy of Engineering Physics, Mianyang 621900, PR China
\textsuperscript{b} Jointment Laboratory for Extreme Conditions Matter Properties, Southwest University of Science and Technology Research Center of Laser Fusion, CAEP, Mianyang 621010, PR China
\textsuperscript{c} School of Chemical Engineering and Technology, Harbin Institute of Technology, Harbin 150001, China

Abstract: II-VI group compound semiconductors, on account of their direct and rather large band gap, high optical absorption and high electron affinity, are important materials for scientific and technological using. Cadmium sulfide (CdS) and cadmium selenide (CdSe) are two representative II-VI group semiconductors with a direct band gap of about 2.4eV and 1.7eV respectively, and they have a large absorption coefficient and wide absorption band edge. Aforementioned, CdS and CdSe are used in optoelectronic, solar energy and solid state optics applications. Nanocrystallite semiconductor thin films show the size-dependent properties, and their energy band structure can be tailored by modifying the nanoparticles size. They also have peculiar optical and electrical properties. Many methods have been taken to fabricate CdS and CdSe thin films. Because of its simplicity and low cost, electrodeposition has been widely researched for manufacturing nanocrystalline semiconductor thin films. In this research, we fabricated multilayer films by electrodeposition, which were obtained by alternately depositing CdS and CdSe nanocrystalline films on indium tin oxide (ITO) conductive glass. And all of these films were electrodeposited in a thermostat-controlled three-electrode cell by using galvanostatic technique. The components of CdS/CdSe films were examined by Energy Dispersive X-ray Spectroscopy (EDX) and XRD. Morphology of films was characterized by SEM.

Keywords: Electrodeposition, Multilayer films, CdS, CdSe, Nanocrystalline films

References: