Formation of $Cu_{2-x}S$ nanoparticle film via electrophoretic deposition

박윤수, 홍윤건, 조건희, 하돈형†
중앙대학교
(dhha@cau.ac.kr†)

In this study, copper sulfide colloidal nanoparticles (NPs) were electrophoretically deposited on silicon substrates by controlling NP concentrations, applied voltages, and deposition times. The synthesized colloidal NPs showed roxbyite phase with tetradecahedrons shape. Growth of nanostructured $Cu_{2-x}S$ films was controlled by the electrophoretic deposition (EPD) process parameters aimed to uniform and smooth film. The thickness of $Cu_{2-x}S$ film can be controlled by varying the applied voltages (100 V ~ 500 V) and deposition times (5 s ~ 900 s) with various NP concentrations (0.1 ~ 0.5 mg / ml). The uniform nanoparticle films were obtained when the deposition is performed with high NP concentrations through layer-by-layer growth mode. The applied voltage affects the growth rates resulting in a high deposition rate at high applied voltage. Through optimizing deposition time and EPD voltage, a fine adjustment of film thickness and thick film (~ 4.9 μm) were achieved.