

Gallium-Induced Perturbation of Zinc Selenide Quantum Dots Electronics

A rare cationic chemistry of Ga^{III} has been used to modulate the optical and electrochemical properties of selenide quantum dots. Three different types of 3-mercaptopropionic acid (3MPA)-capped quantum dots (ZnSe-3MPA, Ga₂Se₃-3MPA and Ga-doped ZnSe-3MPA) were synthesized in highly basic aqueous media (pH = 12.12) at room temperature. Three-dimensional emission-excitation matrix spectra (3D EEM), as well as, the ultraviolet visible spectroscopic bands of the Ga-doped ZnSe-3MPA were similar to the average values obtained for ZnSe-3MPA and Ga₂Se₃-3MPA. Electrochemical studies revealed that gallium-induced vacancies caused a significant enhancement in the conductivity of the Ga-doped ZnSe-3MPA compared to the conductivity of a mixture of ZnSe-3MPA and Ga₂Se₃-3MPA.