Gallium-Induced Perturbation of Zinc Selenide Quantum Dots Electronics

Peter M. Ndangili*[1], Milua Masikini[2],Usisipho Feleni[2] ,Samantha Douman[2], Oluwakemi Tovide[2], Avril Williams[2] ,Priscilla Baker[2] and Emmanuel I. Iwuoha[2]

[1*]Department of Chemical Science and Technology, Technical University of Kenya
[2]SensorLab, Department of Chemistry, University of Western Cape, Bellville, South Africa

Abstract

A rare cationic chemistry of GaIII 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.

Chemistry Select Vol.2(24) pp.7054-7062(2017)
See more at: https://onlinelibrary.wiley.com/doi/abs/10.1002/slct.201700748