

Effects of Biopolymer Surfactants on the Morphology and Optical Properties of Zinc Sulphide (ZnS) Nanocrystalline Thin Film

Dorathy Awing Avit,¹ Suk-Fun Chin,^{1*} Noor Azie Azura Mohd Arif²
and Sahbudin Shaari³

¹Faculty of Resource Science and Technology, Universiti Malaysia Sarawak,
94300 Kota Samarahan, Sarawak, Malaysia

²Centre for Pre-University Studies, Universiti Malaysia Sarawak,
94300 Kota Samarahan, Sarawak, Malaysia

³Institute of Microengineering and Nanoelectronics, Universiti Kebangsaan Malaysia,
43600 Bangi, Selangor, Malaysia

*Corresponding author: sfchin@unimas.my

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ABSTRACT: *Particle sizes of nanoparticles have significant effects on thin film properties such as the morphological and optical properties. However, controlling the size and morphology is a challenging task. One of the approaches towards overcoming these challenges is by using surfactants. This study reported the effects of several types of biopolymer surfactants on the size of zinc sulphide (ZnS) nanoparticles and the morphology of ZnS nanocrystalline thin films. The ZnS nanocrystalline thin films were fabricated by the spin-coating of ZnS nanoparticles on APTES [(3-aminopropyl) triethoxysilane] functionalised silica glass. Alginate acid, chitosan and starch were used as the surfactants to control the morphological and optical properties of the thin films. The XRD analysis confirmed the cubic structure and crystalline nature of the ZnS thin films. The field emission scanning electron microscope (FESEM) analysis revealed that the mean particle size of the ZnS nanocrystalline thin film to be within the range of 20–30 nm. The optical measurements revealed that all ZnS thin films exhibited a high transmittance of 92%–99% in the visible range. Photoluminescence (PL) spectra for all thin films were determined and exhibited their respective peaks at 470 nm and 620 nm.*

Keywords: Zinc sulphide, spin coating, biopolymer surfactant, nanocrystalline, thin film