

pH Sensing Characteristics of CuS/ZnO Thin Film Implemented as EGFET

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Copper sulphide (CuS) is one of the most important semiconductor materials used in many applications for its semiconducting characteristics. CuS nanoscale thin films were deposited on various substrates using various methods of deposition; recently CuS thin films were used as extended gate field effect transistor (EGFET) and implemented as a pH sensor. In this work, CuS thin film was deposited on ZnO layer using spray pyrolysis deposition (SPD), the precursors used to prepare CuS solution were copper chloride and sodium thiosulfate with 0.4 M concentration, and these precursors were solved using deionized water. The structural characteristics of this thin film show two phases for CuS; covellite and chalcocite with grain size of 31.2 nm. Nanoplate structure with a lot of aggregations was achieved from this deposition and it's confirmed by morphological examination, which estimate the roughness of the film to be 0.145 nm. CuS/ZnO thin film was used as EGFET and applied as pH sensor; the sensitivity and hysteresis were measured for this sensor to be 23.3 mV/pH and 17.5 mV, respectively.

Keywords: CuS/ZnO thin film; nanoplates; EGFET; pH sensor; hysteresis.