

# Structural and Optical Properties of ZnS Thin Films Prepared by Chemical Bath Deposition Technique

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In this work, ZnS thin films were deposited on glass substrates by chemical bath deposition. The effect of bath temperature, deposition time, zinc ion, sulfate ion concentration, complexing agent (NH<sub>3</sub> and trisodium citrate) and different pH values on the deposited films have been studied. A chemical activation energy  $E_a$  was calculated and its value was approximately (5.8 Kcal/mol).

The structural properties (XRD peaks) of synthesized ZnS thin films, at varies deposition temperatures and times, suggest the crystallinity of the thin films deposited at various temperatures. FESEM results shows that the growing process of the films presents the formation of clusters on the surface. The deposited films show flower-like structure of micrometer size, the bigger structure formed due to the agglomeration of small size nanorods.

In addition, the optical properties (transmission, and energy gap) were studied. It has been found that the average transmittance is temperature dependence and its maximum is (80 %), varies from temperature to another. The optical transmittance decreases from (80 to 55 %) with an increase in the temperature of the bath from (50 °C) to (80 °C). A red shift is an indication of the increase in thin film thickness.

The values of energy gap increased from (3.998 eV) to (4.019 eV) with a decrease in the thickness of the film from (457 nm) to (113 nm). The energy gap decrease from (4.019 eV) to (3.998 eV), as the bath temperature increased from (50 °C) to (80 °C) for optimum deposition time (45 min).