Fabrication of ZnS and ZnO Thin Films via Chemical Bath Deposition for CIGS Thin Film Solar Cell Applications

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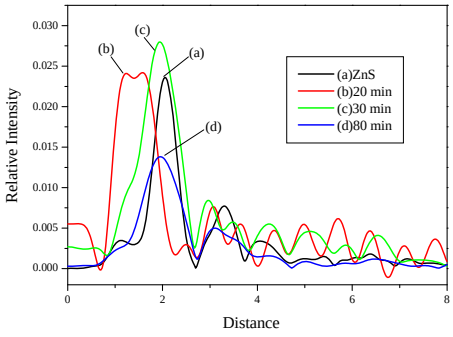
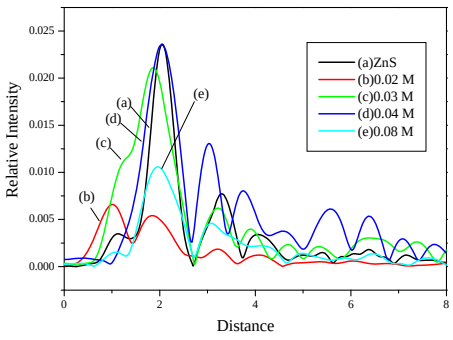
Chemical bath deposition (CBD) is a simple route to prepare II-VI semicondutive zinc sulfide thin films, which are formed at the surface of glass or silicon wafer substrates in the solution containing the precursors of zinc and sulfur ions in terms of ambient conditions of different acidity.

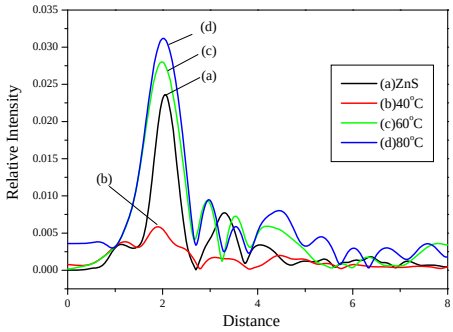
The sulfur peak of the RDF spectra from EXAFS for ZnS film by chemical bath deposition for 30 min or greater is similar to that of pure ZnS powder. It implies that the synthesis time of ZnS film should be at least 30 min. The result shows the required concentration of precursor is higher than 0.30 M. We found the distance for the first coordination position in RFD spectrum using **beam-line 16A1** analysis is 2 Å for ZnS films, which agrees with the lattice constant of ZnS wurtzite structure. The CBD processing conditions to obtain uniform ZnS films are 60°C for 1 hr. We also realize the ZnS films with various annealing temperature have no significant difference in their RFD spectra. Nevertheless, the distance for the first coordination of RDF results decreases slightly for the longer annealing time because the densification effect of ZnS films via annealing treatment.



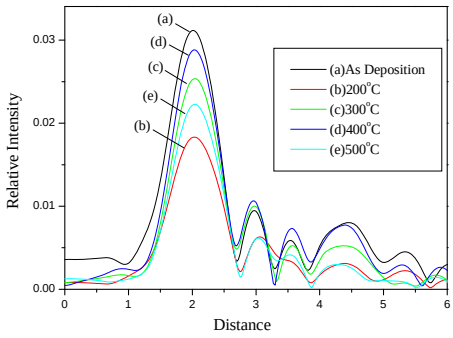
ZnS film in the different deposition time of the radial distribution function by CBD.



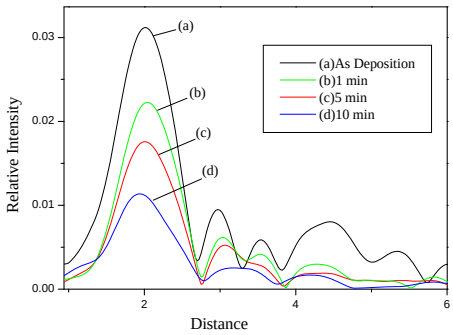
ZnS film in the different reaction concentration of the radial distribution function by CBD.



ZnS film in the different reaction temperature of the radial distribution function by CBD.



ZnS film in the different annealing temperature of the radial distribution function by CBD.



ZnS film in the different annealing time of the radial distribution function by CBD.