

عنوان مقاله:

Chemical synthesis and characterization of Zn-doped cadmium oxide based nanoparticles: As nanofluids for thermophysical applications

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خلاصه مقاله:

Semiconductor nanoparticles are studied worldwide at present because of their good optical, physical and chemical properties. In this research work, a set of Zn doped cadmium oxide ($Cd_{1-x}Zn_xO_{1-\delta}$) nanoparticles were synthesized by simple chemical precipitation route. The precursor materials used in this research work were cadmium nitrate and zinc nitrate (as basic materials) and sodium hydroxide (as a precipitator material). The formed hydroxides of Cd/Zn were washed with water and ethyl alcohol (۹:۱ v/v) and dried at ۷۵۰ C overnight. The dried powder was then heat treated for ۱ h each at ۱۵۰, ۳۰۰, ۴۵۰ C respectively and then cooled down to room temperature. The prepared nanoparticles were characterized by XRD where the peaks are well matched with the phase purity of cubic structure. FTIR analysis confirmed the presence of the functional groups present in the pure and Zn doped CdO nanoparticles. The SEM results showed that the obtained nanoparticles are polycrystalline in nature having the average grain size of ۱۰۰-۲۰۰ nm. The molecular interactions with respect to the different dopant concentrations (Zn) and their thermo-physical characteristics of CdO based nanofluids ($Cd_{1-x}Zn_xO_{1-\delta}$; where $x=0, 0.05, 0.10, 0.15$ and 0.20) prepared in ethylene glycol are studied and reported. The results were discussed and presented in this manuscript. From the results, it was found that the intermolecular free length of the present nanofluids are seemed to be increasing with the higher incorporation of Zn^{2+} ions in CdO nanoparticles.

کلمات کلیدی:

Zn doped CdO nanoparticles, chemical precipitation method, molecular interactions in nanofluids, thermo-physical characteristics

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