SYNTHESIS AND CHARACTERIZATION OF ZINC OXIDE NANOPARTICLES WITH DIFFERENT MORPHOLOGY FOR OBTAINING NANOFLOUIDS

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Nanofluids are defined as a dispersion of nanomaterials in a base fluid. These have a high potential of use in different industrial applications, especially for improving the thermal conductivity of fluids (water, ethylene glycol, etc.) in heat transfer processes. The increase of this thermophysical property is determined by the properties of the dispersed nanoparticle, such as shape and size among others. Therefore, the synthesis and characterization of the particles is the most important stage before to prepare nanofluids. In this work the synthesis of zinc oxide nanoparticles (ZnO) was carried out in zero dimensions (0D) and one dimension (1D), based on the method of controlled precipitation and hydrothermal treatment, for each metal oxide morphology respectively. The in 0D nanoparticulas were synthesized zinc acetate dihydrate, in isopropanol and precipitation with KOH. Also, zinc nitrate hexahydrate, and ethylenediamine in the presence of KOH was used as structure directing agent for obtaining particles in 1D. Nanoparticles obtained were characterized by Field Emission Scanning Electron Microscopy (FESEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), thermal analysis (TGA/DSC/DTA), infrared spectroscopy (FTIR), UV-vis spectroscopy. The XRD analysis confirms a good crystallinity for the metal oxides synthesized in each morphology, with presence of hexagonal wurtzite phase, in addition particles with dimensions between 1-100 nm with hexagonal shape and nanobars according to the analysis by FE-SEM and TEM. The nanofluids obtained by ultrasound at ZnO concentrations of 0.05, 0.25 and 0.50 wt.% were dispersed in water as based fluid, have good stability under the presence of ionic surfactants as Sodium dodecylbenzene sulfonate (SDBS) and hexadecyltrimethylammonium bromide (CTAB). The different morphological and structural characteristics of nanoparticles synthesized represent an alternative to prepare nanofluids for heat transfer applications.

Keywords: Nanoparticles, Zinc oxide, Nanofluid

Acknowledgment:

Universidad Nacional de Colombia Sede-Medellín and to the research group Advanced Materials Sciences. Metropolitan Institute of Technology of Medellín, ITM and the Thermal Sciences Laboratory.

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