CHAPTER VI

CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

6.1 CONCLUSIONS

In this work CuO and MgO nanoparticles were synthesized using co-precipitation method. The nanoparticles were characterized using XRD, SEM and TEM analysis. From XRD analysis the crystalline size of CuO and MgO nanoparticles was calculated. The SEM and TEM analysis confirm the nanostructure of CuO and MgO particles. Totally 20 EG based binary base fluids and 200 nanofluids systems (100 CuO nanofluids and 100 MgO nanofluids) were prepared and analyzed for the particle-fluid and particle-particle interactions with the help of ultrasonic studies.

In the ultrasonic studies, the variations clearly indicate the enhancement in particle-particle interaction resulting in the formation of clusters at higher concentrations. The possible reason is presented at low concentration range the inter particle distance is longer and hence the particle-fluid interaction dominates. But at higher concentrations as the inter particle distance decreases due to the availability of more number of particles, the particle-particle interaction is strengthened. The hydrodynamic interactions between particles become important as the disturbance of the fluid around one particle interacts with that around other particles at higher concentrations. The temperature effect on fluid is explained using Open- and close-packed structure of fluids.

The use of nanometer-sized particles with a large specific area could improve the heat transfer. Among all the nanofluids prepared, CuO/MgO-EG based nanofluid was demonstrated to have superior features with the highest thermal conductivity and lowest viscosity. It is concluded that thermal conductivities of the nanofluids track the thermal conductivities of the corresponding base fluid.
From the above results, it is concluded that 5 Wt% of de-ionized water based CuO nanofluids has an optimal thermal performance because of its higher thermal conducting property and it has the potential for using it as a heat transfer fluid compared with the other nanofluids prepared.

6.2 SUGGESTIONS FOR FURTHER RESEARCH

6.2.1 Optimized Particle size

The size of nanoparticles suspended in nanofluids have potential role in determining the effective thermal conductivity. It is also a significant factor that it may be used to attune the suspension stability and thermal properties of nanofluids. So, the present work may be extended by using optimized size of the nanoparticles.

6.2.2 Better Stability

The stable suspensions of minimum quantities of nanoparticles in nanofluids may be useful to design compact and high performance thermal management systems. The stability of nanofluids may be increased by adding suitable surfactants, functionalized nanoparticles or by controlling the influence of pH effects.