Chapter 8

Recommendations for the Future Work

CHAPTER 7

Recommendations for the Future Work

The present study has reported that various light absorbing and conducting nanomaterials can be effectively utilized for absorption of solar energy in conventional heat transfer fluids such as water, ethylene glycol and silicone oil. However, more detailed investigation is required in this regard, since use of nanofluids for such applications have shown to exhibit considerable enhancement in the energy efficiency for the renewable energy future, the world is looking at. Although it has been demonstrated in the present work that the efficiency can be increased appreciably by optimizing various parameters such as particle concentration, nanomaterial size and shape, even the increased efficiency is not sufficiently high for its commercial success in industrial applications. Hence, there is much scope for the further improvement in the overall solar energy harvesting systems. Though, the present work focusses on wide variety among different materials groups, few more materials, material combinations, hybrid materials, nanocomposite materials, can be explored to arrive at the best possible solution. Variety of popular thermic fluids and different heat transfer oils other than reported in the present study can be explored for such applications.

Nanofluids are typically stable suspensions of nanoparticles. Getting stable suspension itself is a challenge. Therefore, separate studies on improving stability of suspensions is required for better efficiencies, as well as for long term use and practical feasibility of the systems. Much has been done on modification of solar collector configuration for enhanced absorption of solar energy. However, solar collectors for direct absorption of sun light using nanofluid as a working fluid are essentially new and need significant attention from research groups for improvement in specific geometric parameters required for this application. There are many places where energy losses occur. Further studies are required to minimize these thermal energy losses for getting commercial success for such systems. Recovery of nanomaterials in open loop systems, studies utilizing close systems are essential for commercial success. Further, health, safety and environmental impact of nanomaterials need immediate attention. Solar energy absorption is one thing, but storage of absorbed energy for long term is again a challenge. Energy storage systems need considerable attention so that capability of such systems would be improved for effective utilization of absorbed solar energy. Detailed understanding of theoretical aspects of the nanoparticle suspensions, their properties

affecting solar energy absorption is one more area that requires immediate attention for generalization of experimental results.

Solar desalination is important application area which need significant attention as requirement of fresh water is increasing day by day. Fresh water availability is critical to human being and at many locations in the world. Sea water is the biggest feedstock source for such applications. More detailed work is required to study the viability of solar base desalination systems utilizing nanomaterials. The detailed cost analysis of such systems is required for their commercial success.