Seminar

Institute for Plasma Research

Title : Investigations on nanofluids as working medium in domestic solar water heating systems

Speaker: Dr. Sayantan Mukherjee
Institute for Plasma Research, Gandhinagar, Gujarat

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Venue : Seminar Hall, IPR

Abstract: Solar energy is often regarded as one of the remedies to the ever-increasing energy crisis. To convert solar energy into a useable form, a variety of solar energy conversion technologies have been used. Thermal performance of solar energy systems depends on the type of the working fluid they use for solar energy conversion and transportation. Nanofluids have acquired an important place in different heat transfer applications due their promising heat transfer characteristics, which is also tunable as per requirements. Therefore, such advantage of nanofluids needs to be exploited in various applications such as energy conversion, heat transfer and process engineering. However, thorough analyses of nanofluids are crucial prior to their application. In the present work, we present an investigation on the preparation, stabilization, and optical absorbance characteristics of nanofluid applicable as a working fluid in a flat plate solar water heater system for domestic purposes.

Water based CuO nanofluids are prepared at IPR by ultrasonic assisted two-step method at three different concentrations of 0.01, 0.03 and 0.05 wt. %. The prepared samples are stabilized using Gum Arabic. Visual inspection and DLS analyses are performed to check the stability of nanofluid. Absorbance potential of samples are examined under direct sunlight and a 50W LED light source inside a closed chamber. The nanofluids remains stable even after 6 months. The nanofluids shows more temperature rise than water when exposed to different light sources. The temperature of 0.03 wt% nanofluid rises up to 60°C which is maximum among the highest temperature achieved by all the test samples. The absorbance efficiency was maximum of for 0.03 wt% sample. A customized flat plate solar water heating system has been developed as a system of nanofluid implementation for future scope of this investigation. Moreover, use of different nanomaterials, basefluids and surfactants are considered for future extension of this work. The details of this work will be presented here.

Keywords: Nanofluids, Solar energy, Solar water heater, Heat transfer, efficiency