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Theoretical Study of Thermophysical Properties of Carbon Nanotubes in Education for Making India

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ABSTRACT

The present paper presents a literature review of theoretical study of thermo physical properties of carbon nanotubes in education for making India. In deals about basics, historical developments, nanoparticle production techniques, nanofluids and its preparation methods and limitations of using nanofluids.

This paper presents a literature review of the research in this field. This paper briefs about basics, historical developments, nanoparticles production techniques, nanofluids and its preparation methods and limitations of using nanofluids. The paper discusses about limitations of literature reviewed and also informs about future research directions required in this field.A checklist to be used while publishing papers related to nano particles is also proposed.Though research with Nanofluids is in primitive stage, it will not be a surprise if just like any other refrigerant;nanorefrigerants will be commercially available in future.

1. Introduction-

Monetary savings from energy efficient systems and responsibility felt to contribute to save environment are encouraging researches to use different TechnologiesAnd advancements in science to make their equipments and systems more and more energy efficient. Refrigeration systems are no exceptions. This paper presents a literature review of the research with nanofluids relevant for refrigeration systems. Reviewed literature is classified in two sections. First section evaluates basic properties of nanofluids like thermal conductivity, viscosity, heat transfer coefficient, friction factor and 2nd section analysis application of nanofluids in refrigeration system. From literature reviewed it can be said that, for the use of nanofluids in refrigeration more research is needed in both fundamental science and indirect application. Heat transfer depends on thermal conductivity of nanofluid, and compressor energy efficiency depends upon viscosity and friction factor. Therefore,focus for fundamental research should be on determining these thermophysical properties, mechanism of thermal transport and tribological behaviour. An application related research is also equally important.It needs to be carried out simultaneously with the basic research so that basic research can be more focused on obtaining desirable properties, and developing nanofluids. An applied research must be focused on stability of nano refrigerants.The use of nanofluids appears promising, but has several challenges. Nanofluid stability and its production cost are major hurdles in using nanofluids. Since research about nanofluids is only in primitive stage large amount of research is possible in this field. This presents a big challenge to find suitable nanofluids of desirable properties for refrigeration application.While evaluating performance of refrigeration system, effect of nanofluid preparation method, effect of various types of nano particle materials, Variation of sizes of nano particles, variation of concentration of nano particles, variation of suspension concentration in refrigerant needs to be investigated. Available nanoparticle material are limited, however there are two many combinations of basic fluid(Refrigerants and oils)With nano particles and too many variables(Sizes, concentration) and alternatives to explore and research. Development of

nanoparticle production and dispersion technique will further enhance nanofluid research possibilities. Any new development of nanoparticle material shall also go through all production, research and experimentation steps. Public concern about nano particles safety both in production and in use shall also be required to be considered. Possibility of using non-toxic or biodegradeable nano particles can also be explored. Low cost, high volume production of stable green nanofluids suitable for refrigeration application is one of the most challenging objectives.

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