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Short Communication

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ABSTRACT

Nanocomposites have improved aspect ratio and better mechanical properties when compared to the composites which had structures less than 100nm They are 1000 times tougher compared to conventional composites. Besides mechanical properties, nanocomposites also have improved electrical conductivity, thermal stability, chemically resistant, flame retardant and low permeability. TiO₂ finds its best application in the field of photo catalytic activity and it is used in sunscreen lotions since it is resistant to UVA(315-400nm) and UVB(280-315nm). Fe₂O₃ is used as the pigment in construction of roof tiles, pavers, plaster etc. It is used as a polishing agent for glass, diamonds and it is dental abrasive. It is reported that a nanocomposites of TiO₂- Fe₂O₃ have improved visible water light splitting, and photocatalytic degradation of pollutants. The acute toxicity of the oxide nanoparticles make them suitable for their applications. The objective of the present work is to synthesize composites of titanium dioxide -iron oxide

by a simple sol gel route in laboratory scale and to validate them as nanoparticles for preparation of nanofluids.

KEYWORDS: Sol gel, TiO₂, Fe₂O₃,Nanocomposite

1. INTRODUCTION

The study of nanocomposites started about 1950 when they were first referenced .For the past 70 years there has been considerable research in nanomposites through the change in matrix or fiber phase and other geometrical variations. The unique properties of nanomaterial have further attracted scientists and engineers to manufacture nanocomposites. Nanocomposites show promising potential applications in battery cathode material,non linear optics,ionics,nanowires and sensors[1]. Among the several nanocomposites that are tailored,oxide nanocomposites have been mostly investigated because of easy preparation, less cost with minimum toxicity. α Fe₂O₃ TiO₂ nanocomposites have been synthesized by two step hydrothermal method which require titanium sheets [2]. Fe doped TiO₂ nanoparticls have been prepared by hydrothermal method with TiCl₄ and FeCl₃ as precursor solution. Interesting results of pure TiO₂ with 10-15nm and Fe doped TiO₂ nanocomposite of different morphology and size using Titanium Tetra Iso propoxide and FeCl₃ as precursors. But large nanocomposite particles of 100-150nm of TiO₂-Fe₂O₃ was obtained.

2. EXPERIMENTAL

Titanium Tetra Iso Propoxide (TTIP) 4.2gm is mixed with 5ml of distilled water and mixed in a magnetic stirrer for about 2 hrs. 5 ml of Polyethylene glycol is added to the mixture. The color turned milky white after 2 hrs of stirring.. 2 ml of FeCl₃.6H₂O was added in the solution to give a yellow colour The colour changed to dark yellow by adding 4 ml of Dilute Hydrochloric acid. 1 pellet of Sodium