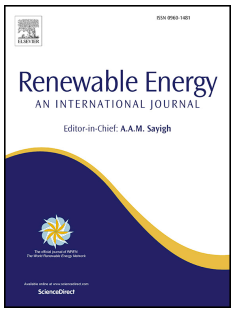
Accepted Manuscript



Effect of electrostatic stabilization on thermal radiation transfer in nanosuspensions: Photo-thermal energy conversion applications

Layth Al-Gebory, M. Pinar Mengüç, Ali Koşar, Kürşat Şendur

PII: S0960-1481(17)31247-8

DOI: 10.1016/j.renene.2017.12.043

Reference: RENE 9540

To appear in: *Renewable Energy*

Received Date: 9 September 2017

Revised Date: 3 December 2017

Accepted Date: 12 December 2017

Please cite this article as: Al-Gebory L, Mengüç MP, Koşar A, Şendur Küş, Effect of electrostatic stabilization on thermal radiation transfer in nanosuspensions: Photo-thermal energy conversion applications, *Renewable Energy* (2018), doi: 10.1016/j.renene.2017.12.043.

Effect of Electrostatic Stabilization on Thermal Radiation Transfer in Nanosuspensions: Photo-thermal energy conversion applications

Layth Al-Gebory[1,2], M. Pinar Mengüç[1], Ali Koşar[3,4], Kürşat Şendur[3,4]

[1] Department of Mechanical Engineering and CEEE, Özyeğin University, Çekmeköy, 34794 İstanbul, Turkey

[2] Department of Materials Engineering, University of Technology, Baghdad, Iraq

[3] Mechatronics Engineering Program, Sabancı University, Tuzla, Istanbul 34956, Turkey

[4] Center of Excellence for Functional Surfaces and Interfaces for Nano Diagnostic, Sabancı University, Tuzla, Istanbul 34956, Turkey

layth.ismael@ozu.edu.tr, pinar.menguc@ozyegin.edu.tr, kosara@sabanciuniv.edu, sendur@sabanciuniv.edu

Abstract

Solar thermal collectors are among the most important photo-thermal energy conversion systems. Effectiveness of these systems is measured by the ability of working fluid to absorb incident radiative energy. Although nanosuspensions are considered very promising for this purpose, there is a concern about their stability and their long-term use. Electrostatic and steric stabilization methods are among the two approaches used for colloidal suspensions. In thermal applications, electrostatic stabilization is usually preferred; especially in high temperature applications. The aim of this study is to investigate, both experimentally and numerically, the effect of electrostatic stabilization on the thermal radiation transfer mechanisms in TiO_2 and Al_2O_3 nanosuspensions. The experimental section covers nanosuspensions preparation and characterization, where the effects of electrostatic stabilization (pH and zeta potential values) on the increasing effective particle size due to agglomeration behaviour are explored. The numerical part covers the estimation of radiative properties and thermal radiation transfer based on the average particle agglomerate size