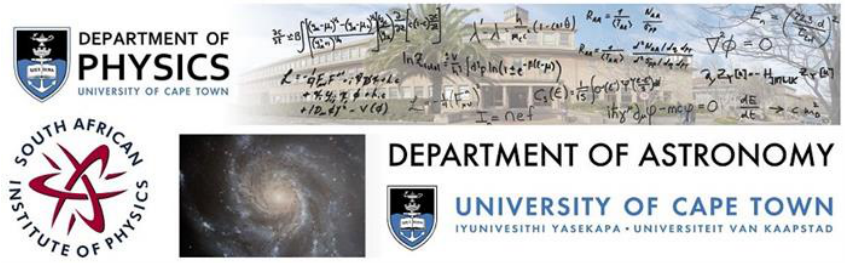

Contribution ID: **433** Type: **Poster Presentation**

Iron (III) Oxide Nanostructured Thin Films Based Selective Solar Absorber for Concentrating Solar Power Application

Tuesday, 5 July 2016 16:10 (1h 50m)

Abstract content
   (Max 300 words)
Formatting &
Special chars

Recently, the energy sector in South Africa has attracted significant attention due to the crisis of power outage, high tariffs and a general inability to match supply and demand. To overcome these challenges, new energy resources have to be implemented. The high fossil fuel prices and the first ubiquitous signs of climate change have been enough to assist to the market a number of alternative, renewable sources of energy based on material that harvest and convert solar energy to other forms of energy (i.e. electricity and heat). Concentrating solar power technologies being one of the alternatives, use mirrors to concentrate radiation from the sun and convert it into high temperature heat, which is used to generate steam to drive a turbine that generates electrical power. New efficient material for this system are needed to lower the cost of CSP systems. Iron oxide (Fe2O3) based selective solar absorbers for high temperature conditions on stainless steel substrate are explored. Iron oxide Fe2O3 nanoparticles has the potential to be used as coating for solar absorber and it was investigated and reported once in literature due to its high thermal stability and solar absorption selectivity it was investigated once more in this work. This was done by changing parameters such as deposition time, current density, reaction temperature and solution concentration, using different deposition methods. The coating of Fe2O3 nanoparticles were deposited on the stainless steel substrate using three fabrication process/methods namely electron beam deposition, atomic layer deposition and plasma enhanced chemical vapour deposition. The effects of the thickness, substrate roughness and heat treatment on the performance of the Fe2O3 nanoparticles were analyzed using, HR-SEM, UV-VIS-NIR spectrophotometers equipped by integrating spheres, and Ellipsometry. The absorptance and the emittance were found to be closer to one and near zero respectively.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

PhD

Main supervisor (name and email)
and his / her institution

Mothudi B.M
mothubm@unisa.ac.za

University of South Africa

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

Please indicate whether
this abstract may be
published online
(Yes / No)

Yes

Primary author: Mr MBONGO, Mduduzi (University of South Africa)

Co-authors: Prof. MOTHUDI, Bakang Moses (University of South Africa); Prof. MAAZA, Malik (UNISA UNESCO); Prof. DHLAMINI, Mokhotjwa Simon (University of South Africa); Mr KHAMLICH, Saleh (iThemba LABS)

Presenter: Mr MBONGO, Mduduzi (University of South Africa)

Session Classification: Poster Session (1)

Track Classification: Track A - Division for Physics of Condensed Matter and Materials