

International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

Balapur P.O., Hyderabad – 500005, Telangana, India



Medium and High temperature stable solar absorber receiver tubes for concentrating solar thermal (CST) applications (TRC Project)

Overview

Spectrally selective receiver tube is the critical component in Concentrated Solar thermal (CST) technology. To increase the overall efficiency of a CST system, we need high thermal stable spectral selective coating which can be operated at ≤ 500 °C and should sustain minimum of 25 years without any functional degradation. In order to meet the challenge, we designed and developed a high performance solar selective coating with spinel structures by using transition metals like Mn, Cu and Ni by wet chemical method. Spinel's are amenable to the substitution of a large number of transition metals to tune the optical properties with high thermal stability. We employed a facile low cost wet chemical method to develop coatings.

Key Features

- High solar absorptance $\alpha_{sol} = 0.97$ & Low emittance $\epsilon = 0.16$
- Spinel based nanocomposite oxide
- Thermally stable coating up to 500 °C
- Cost effective

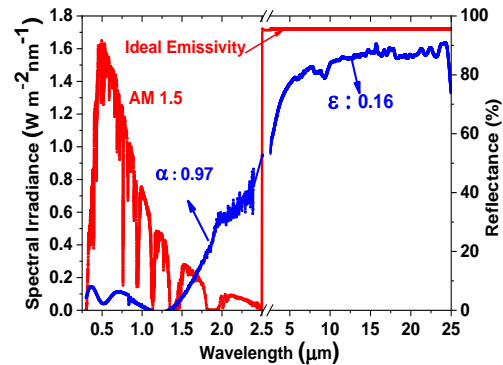
Potential Applications

- Steam generation for various industrial applications
- Power generation
- Solar water heater /Solar dryer
- Solar desalination

Major Patents/Publications

- Indian patent application no. 2142/DEL/2015, date of filling: 15.07.2015.
- Solar Energy Materials and Solar Cells 174 (2018) 423–432.

Optical Properties



0.5 meter of absorber and tandem tubes



1 meter receiver tube

IPDI*	1	2	3	4	5	6	7	8	9	10
Activities	Basic concepts and understanding of underlying scientific principles	Short listing possible applications	Research to prove technical feasibility for targeted application	Coupon level testing in stimulated conditions	Check repeatability/consistency at coupon level	Prototype testing in real-life conditions	Check repeatability/consistency at prototype level	Reassessing feasibility (IP, competition technology, commercial)	Initiate technology transfer	Support in stabilizing production
Status										