

Study of Some Doped and Co-doped Ceria and Ceria/Carbonate Nanocomposite Solid Electrolytes for Solid Oxide Fuel Cells (SOFCs)



THESIS SUBMITTED FOR THE DEGREE OF

Doctor of Philosophy

in

Ceramic Engineering

By

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Supervisor

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2015



DEDICATED
TO
MY BELOVED PARENTS
& My FRIEND
HEMANTH





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UNDERTAKING FROM THE CANDIDATE

I, **Ms. Nandini Jaiswal**, certify that the present work embodied in this Ph.D. thesis is my own bonafide work carried out by me under the supervision of Prof. Om Parkash and co-supervision of Prof. Devendra Kumar (Department of Ceramic Engineering, IIT(BHU), Varanasi, India) & Dr. Shail Upadhyay (Department of Physics, IIT(BHU), Varanasi, India) for a period of 3 years and 11 months from July 2011 to May 2015 in the Department of Ceramic Engineering, Indian Institute of Technology (Banaras Hindu University). The contents included in this Ph.D. thesis have not been submitted for the award of any other degree.

Date:

Place: Varanasi

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I, **Ms. Nandini Jaiswal**, certify that the work embodied in this Ph.D. thesis is my own bonafide work carried out by me under the joint supervision of **Prof. Om Parkash** (Supervisor) and co-supervision of **Prof. Devendra Kumar** (Department of Ceramic Engineering, IIT(BHU), Varanasi, India) & **Dr. Shail Upadhyay** (Department of Physics, IIT(BHU), Varanasi, India) **for a period of about 3 years and 11 months from July, 2011 to May, 2015 at Department of Ceramic Engineering, Indian Institute of Technology (Banaras Hindu University), Varanasi.** The matter embodied in this Ph.D. thesis has not been submitted for the award of any other degree/diploma.

I declare that I have faithfully acknowledged, given credit to and referred to the research workers wherever their works have been cited in the text and the body of the thesis. I further certify that I have not will fully lifted up some other's work, para, text, data, results, etc. reported in the journals, books, magazines, reports, dissertations, theses, etc., or available at web-sites and included them in this Ph.D. thesis and cited as my own work.

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This is to certify that the above statement made by the candidate is correct to the best of our knowledge.

(Signature of Head of the Department with Seal)

Supervisor	Co-Supervisor	Co-Supervisor
Prof. Om Parkash	Prof. Devendra Kumar	Dr. Shail Upadhyay
Department of Ceramic Engineering	Department of Ceramic Engineering	Department of Physics

ANNEXURE F

**COURSE WORK/ COMPREHENSIVE EXAMINATION COMPLETION
CERTIFICATE**

This is to certify that **Ms. Nandini Jaiswal**, a bonafide research scholar of this department, has successfully completed the course work/comprehensive examination requirement which is a part of her Ph.D. programme.

Date:

(Head of the Department)

Place: Varanasi

ANNEXURE F

Pre Ph.D. SEMINAR COMPLETION CERTIFICATE

This is to certify that **Ms. Nandini Jaiswal**, Ph.D. scholar of the Department (Enrollment No. 311519) has delivered her Pre Ph.D. seminar on **12th December, 2014** on the topic **“Study of some doped and co-doped ceria and ceria/carbonate nanocomposite solid electrolytes for solid oxide fuel cells (SOFCs)”** in the Computer Room of the Department to the satisfaction of DPGC, DRC and RPC members.

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Place: Varanasi, INDIA

(Nandini Jaiswal)

Date: