

## DR. RAJEEV SHESHA JOSHI,

Assistant Professor  
School of Physical Sciences,  
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### PERSONAL

Date of birth : 30<sup>th</sup> June 1981  
Nationality : Indian  
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### EDUCATION

#### **Ph. D. in Physics, awarded in January 2010.**

Department of Physics,  
Shivaji University, Kolhapur – 416004 (M.S.) INDIA.  
Title of thesis:

**“Synthesis and Characterization of BICOVOX Solid  
Electrolyte Thin Films For Fuel Cell Application”**

#### **M. Sc. In Physics, 2004.**

Karnatak University, Dharwad, Karnataka -580003, India.  
In First Class, Distinction (Specialization – Solid State Physics).

#### **B. Sc. In Physics (Three year degree course), 2002.**

Karnatak University, Dharwad, Karnataka- 580003. India.  
In First Class, Distinction (Physics, Chemistry, Mathematics).

### AWARDS/ FELLOWSHIPS/RECOGNITION

**Dr. D C Pavate fellowship 2014** from University of Cambridge UK to work at Department of Material Science and Metallurgy.

**Dr. D. S. Kothari Post Doctoral fellowship 2013** from University Grants Commission, New Delhi.

**Best poster award** for the paper ‘*Strain mediated magnetoelectric coupling in NiFe<sub>2</sub>O<sub>4</sub>-BaTiO<sub>3</sub> multiferroic composite*’ in International Union of Materials Research Society-International Conference in Asia 2013 (IUMRS-ICA 2013) at IISc, India.

**Best research paper award**, for the paper titled ‘*Impedance Analysis of the Spray Deposited BICOVOX Solid Electrolyte Thin Films on Platinum Coated Stainless Steel Substrate*’, at International Symposium on Materials Chemistry, ISMC-08, 2-6 Dec 2008, BARC Mumbai.

**Best research paper award**, for the paper titled '*Development of Spray Deposited BICOVOX Solid Electrolyte thin film on Ni-Substrate for Fuel Cell Commercialization*', at National Conference on Commercialization of Renewable Energy Technology, CRET-2009, 21<sup>st</sup> to 23<sup>rd</sup> October 2009, DYPU, Kolhapur.

**Received Senior Research Fellowship (SRF)** to work on the project titled '*Soft Electrochemical Processing and Microwave studies of MgB<sub>2</sub> and Ba<sub>1-x</sub>K<sub>x</sub>BiO<sub>3</sub> Superconducting Films.*' funded by Council for industrial and scientific research (CSIR), from April -2008 –July 2009 at D.Y. Patil University, Kolhapur.

## RESEARCH INTERESTS

### **Magnetism in low dimensional structures**

Electro-Magnetic coupling in solids, specifically in nano size materials and thin films.

Magnetotransport (AC and DC) manganites and ferrites.

Micromagnetic simulation of nano-structures, used in spintronics and magnonics.

### **Synthesis of oxide materials**

Bulk and in thin film form and study their magnetic and transport properties.

### **Relaxation in fast ionic conductors,**

Ionic transport in thin films and bulk fast ionic materials, used in devices like lithium ion batteries and fuel cells.

## EXPERTISE

**Thin film deposition techniques:** Pulsed laser deposition, DC and RF sputtering, Thermal evaporation, Spray Pyrolytic Deposition, Electro-chemical deposition.

**Synthesis techniques:** Solid state synthesis, Solution combustion, Sol-Gel

### **Characterization:**

- Impedance spectroscopy
- High temperature and low temperature AC, DC magnetotransport
- X-ray diffraction for bulk and thin film
- Magnetometry using Magneto Optic Kerr effect
- Magnetometry with Physical Property Measurement system and SQUID
- Scanning Electron Microscopy
- IR, Raman and UV-Visible spectroscopy
- Ferromagnetic resonance (FMR)

### **Simulation:**

- Micromagnetic simulation using n-Mag package

### **Fabrication:**

- Photolithography

Skills in maintaining vacuum and cryogenic systems.

## WORK EXPERIENCE

- Assistant Professor of Physics, at Central University of Karnataka, Gulbarga, from December 2013
- Visiting Scientist, Department of Material Science and Metallurgy, University of Cambridge 2014
- Dr D S Kothari post doctoral fellow at IISc Bengaluru from September 2013 to

December 2013 in Magnetism group.

- Post-Doctoral Fellow (Senior Project Scientist) at IISc Bengaluru, from September 2010 to September 2013, working in micro-magnetism and electromagnetic coupling in solids.
- Experience of teaching physics at undergraduate and pre-university level for two years (2004-2006).
- Worked on oxide ion conductors, thin film fabrication for Solid oxide fuel cells (SOFCs) application at School energy studies, Kolhapur India (2005-2009).
- Experience of working on 'Impedance spectrometric measurements' at Chemistry division, BARC, Mumbai.
- Worked on the project titled "**Experimental Investigation of Heat Transfer Characteristics of CICC (Superconducting Cable in conduit)**", in Summer School, at Institute for Plasma Research (IPR), Gandhi Nagar, Gujarat, in the months May-June, 2003, during the first year of masters' course.
- Worked on the project, "**Formation energy of defects using Barkhausen effect and domain observation**" for the postgraduate degree in Physics (M.Sc.).

## PUBLICATIONS

### International

1. **R. S. Joshi**, Daniel Sylvinson M.R. and P. S. Anilkumar, 'Anisotropic Low field Magnetoimpedance in (001) Oriented  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$  Thin Films', **Journal of Applied Physics** 113 (2013) 17C730.
2. **Rajeev Joshi**, R. Mishra, C.A. Betty, Shilpa Sawant, S.H. Pawar 'Studies on Grain Boundary Effects in Spray Deposited BICOVOX 0.1 Films on Platinum Coated Stainless Steel Substrate', **Ionics** 17 (2011) 69–74
3. **Rajeev Joshi**, R. Mishra, S.H. Pawar, 'Relaxation Studies of Spray Deposited  $\text{Bi}_2\text{Co}_{0.1}\text{V}_{0.9}\text{O}_{5.35}$  Solid Electrolyte Thin Films on Stainless-steel Substrate', **Ionics** 15 (2009) 453-458
4. **R.S. Joshi**, R.K. Nimat, S.H. Pawar, 'Synthesis of Fuel Cell Grade  $\text{Bi}_2\text{Co}_{0.1}\text{V}_{0.9}\text{O}_{5.35}$  Solid Electrolyte Thin Films.' **Journal of Alloys and Compounds** 1-2 (2009) 461-465
5. Debangsu Roy, S Sakshath, Geetanjali Singh, Rajeev Joshi, S V Bhat and P S Anil Kumar, **Journal of Physics D: Applied Physics** 48 (2015) 7.
6. Kaustuv Manna, **R. S. Joshi**, Suja Elizabeth, and P. S. Anil Kumar, Evaluation of the intrinsic magneto-dielectric coupling in  $\text{LaMn}_{0.5}\text{Co}_{0.5}\text{O}_3$  single crystals, **Applied Physics Letters**; 104(20) (2014) 202905-202905-4.
7. P. Senthil Kumar, A.Sakunthala, M. Prabu, M.V. Reddy, **R. Joshi**, Structure and electrical properties of lithium nickel manganese oxide ( $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ ) prepared by P123 assisted hydrothermal route, **Solid State Ionics**. 2014,01, 267.
8. D. Venkateswarlu, P. V. Mohanan, **Rajeev S. Joshi**, and P. S. Anil Kumar, 'Understanding the Magnetization Reversal in Six-Fold Anisotropic Hexagonal Networks', IEEE Transactions On Magnetics, 48-11(2012) 1-4
9. A.G. Bhosale, **Rajeev Joshi**, C.A.Betty, R.Mishra, C.G.S.Pillai S.H.Pawar, 'Relaxation studies of bulk samarium doped ceria electrolyte, **Ionics** 17 (2011) 61–68.
10. A.G. Bhosale, M.B. Kadam, **Rajeev Joshi**, S.S. Pawar, S.H. Pawar, 'Studies on Electrophoretic Deposition of Nanocrystalline SDC Electrolyte Films' **Journal of Alloys and Compounds** 484 (2009) 795-800.
11. S. S. Pawar, K. P. Shinde, **R. S. Joshi**, R. S. Kalubarme, S. H. Pawar, 'Effect of PVA addition on Spray deposited  $\text{Sm}_{0.5}\text{Sr}_{0.5}\text{CoO}_3$  thin films', **Ionics** 16 (2010) 649–

654.

12. A.G. Bhosale, **Rajeev Joshi**, K.M. Subedar, R.Mishra, S.H.Pawar, 'Acetone mediated electrophoretic deposition of nanocrystalline SDC on NiO-SDC ceramics', **Journal of Alloys and Compound** 503 (2010) 266–271.
13. R.K. Nimat, **R.S. Joshi**, S.H. Pawar, 'Substrate Dependent Structural and Electrical Properties of  $\text{Bi}_2\text{Cu}_{0.1}\text{V}_{0.9}\text{O}_{5.35}$  Solid Electrolyte Thin Films' **Journal of Alloys and Compounds** 466 (2008) 341–351.
14. R. K. Nimat, **R.S. Joshi**, S.H. Pawar, 'Temperature Dependent Conductivity and Dielectric Properties of  $\text{Bi}_2\text{V}_{0.9}\text{Cu}_{0.1}\text{O}_{5.35}$  Solid Electrolyte Thin Films', **Material Science & Engineering B** 137 (1-3) (2007) 93-98.

### Book Chapter

**Joshi R.S.**, and Kumar P.S.A. Magnetic Solid-State Materials. In: Jan Reedijk and Kenneth Poepelmeier, editors. Comprehensive Inorganic Chemistry II, Vol 4. Oxford: Elsevier; 2013. p. 271-316.

### National Journals

1. S.H. Pawar, K.P. Shinde, **R.S. Joshi**, S.S. Pawar, 'Combustion synthesis of  $\text{La}_{0.65}\text{Sr}_{0.35}\text{MnO}_3$  nanoparticles for Hyperthermia biomedical treatment.' Medical Journal D.Y.Patil University, Kolhapur, 3 (2008) 17.
2. **Rajeev Joshi**, K.P. Shinde, S.H. Pawar, 'Fuel rich Solution Combustion of Nickel Nitrate; Ni-NiO Composite for Hyperthermia Application.', Medical Journal D.Y.Patil University, Kolhapur 2-3 (2009) 123
3. R.K. Nimat, **Rajeev Joshi**, C.A. Batty, S.H. Pawar, 'Synthesis of BICUVOX Solid electrolyte Thin film on Tantalum Substrate by Spray Pyrolysis Technique for Biomedical Sensors.', Medical Journal D.Y.Patil University, Kolhapur 2-3 (2009) 134.
4. A.G. Bhosale, **Rajeev Joshi**, S.S. Pawar, S.H. Pawar, 'Combustion Synthesis of Nanocrystalline Samarium Doped Ceria Powder for Energy Application.' Medical Journal D.Y.Patil University, Kolhapur, 2-3 (2009) 145.
5. K.P. Shinde, **R.S. Joshi**, S.H. Pawar, 'Combustion Synthesis of  $\alpha\text{-Fe}_2\text{O}_3$  Powder for Hyperthermia Application.', Medical Journal D.Y.Patil University, Kolhapur 2-3 (2009) 113.
6. S.S. Pawar, K. P. Shinde, R.S. Kalubarme, **R.S. Joshi**, A.G. Bhosale S. H. Pawar, 'Combustion Synthesis of Porous  $\text{Sm}_{0.5}\text{Sr}_{0.5}\text{CoO}_3$  using polyvinyl alcohol.', Medical Journal D.Y.Patil University, Kolhapur 2-3 (2009) 158.

### Review article

7. **Rajeev Joshi**, S.S. Pawar, R.V. Ranade, S.H.Pawar, 'Bioelectrical Impedance Spectroscopy for Medical Applications', Medical Journal D.Y.Patil University, Kolhapur, 2-2 (2009)10-20.

### Popular Article

8. **Rajeev Joshi**, 'Fuel Cell – A technology of hope in the midst of Energy Crisis', Emerging Science, 3(2011)1-5.

## Proceedings

1. K. P. Shinde, S. S. Pawar, **Rajeev Joshi**, S. H. Pawar, 'Magnetic Refrigeration: An Energy efficient Technology' **Proceedings of Commercialization of Renewable Energy Technology (CRET-2009)**.
2. **Rajeev Joshi**, S. S. Pawar, K. P. Shinde, S. H. Pawar, 'Impedance Spectroscopy for Energy Applications' **Proceedings of Commercialization of Renewable Energy Technology (CRET-2009)**.
3. A.G. Bhosale, **Rajeev Joshi**, and S. H. Pawar, 'Electrophoretic Deposition for Green Energy Technologies' **Proceedings of Commercialization of Renewable Energy Technology (CRET-2009)**.
4. S. S. Pawar, K. P. Shinde, R. S. Joshi, S.H. Pawar, 'Sm<sub>0.5</sub>Sr<sub>0.5</sub>CoO<sub>3</sub> as a Cathode Material for Solid Oxide Fuel Cell with Spray Pyrolysis Technique.', **Proceedings of Commercialization of Renewable Energy Technology (CRET-2009)**.
5. K. P. Shinde, **R. S. Joshi**, S. S. Pawar, R. S. Kalubarme, S. H. Pawar, 'Preparation of La<sub>0.65</sub>Sr<sub>0.35</sub>MnO<sub>3</sub> nanoparticles by combustion technique for hyperthermia therapy application', **Proceedings of the 54th DAE Solid State Physics Symposium-2009 (DAE-SSPS-09)**.
6. S. S. Pawar, **R. S. Joshi**, K. P. Shinde, R. S. Kalubarme, S. H. Pawar, 'Spray deposited porous Sm<sub>0.5</sub>Sr<sub>0.5</sub>CoO<sub>3</sub> cathodic thin films for Solid Oxide Fuel Cell', **Proceedings of the 54th DAE Solid State Physics Symposium-2009(DAE-SSPS-09)**.
7. R.K. Nimat, **R.S. Joshi**, S.H. Pawar, 'Oxide Ion Conductivity of Copper Substituted Bismuth Vanadate Thin Films.', **Proceedings of 53<sup>rd</sup> DAE Solid State Physics symposium-2008, (DAE-SSPS-08)**.
8. R. K. Nimat, **R.S Joshi**, S.H. Pawar, 'Dielectric Properties of Copper Substituted Bismuth Vanadate Thin Films.', **Proceedings of 52nd DAE Solid State Physics symposium -2007, (DAE-SSPS-07)**.
9. **R.S. Joshi**, R.K. Nimat, R. Mishra, S.H. Pawar, 'Temperature Dependent Impedance Spectrometric Studies of Bi<sub>2</sub>Co<sub>0.1</sub>V<sub>0.9</sub>O<sub>5.35</sub> Solid Electrolyte Thin Films.' **Proceedings of International Conference on Advanced Materials and Applications (ICAMA-2007), Shivaji University, Kolhapur.**

## MEMBERSHIP OF PROFESSIONAL BODIES

- Life member of Society for material chemistry, BARC, India.
- Life member of Material Research Society of India, IISc, Bangaluru.
- Life member of Indian Society for Atomic and Molecular Physics, PRL, Ahmadabad.
- Life member of District Science Center, Karwar, Karnataka.
- IEEE, Magnetic Society Membership for 2012-2013.

## EXTRACARICULARS

- Attended Naval Academy Attachment at **INS MANDOVI, GOA -2002**
- C-Certificate in National Cadet Corps (NCC) - Naval wing, with B Grade (Six years cadet training program).
- Won prizes in debate and elocution competition at school, college and university levels.
- Won silver medal in 'Mahabharata' Exams conducted by 'Kannada Seva Pratishtana'.
- Worked as quiz master for regional and district level quiz competitions.

## LEISURE

I relish reading 'Self' and books, writing poetry, and popular science articles. I have written acted and directed in stage plays, alongside waving hands with classical music and photography

## REFEREES

### 1. Prof. P. S. Anil Kumar,

M.Sc., Ph. D.

Associate Professor,  
Department of Physical Sciences,  
Indian Institute of Science,  
Bengaluru- 12  
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### 2. Prof. S.H. Pawar

M.Sc. Ph.D., F.I.C.C, F.M.A.Sc.

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### 3. Prof. B.G. Mulimani

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### 4. Dr. R.Mishra

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Chemistry division, BARC, Mumbai  
Email- mishrar@barc.gov.in