

## DR. RAJEEV SHESHA JOSHI,

Assistant Professor  
Department of Physics  
School of Physical Sciences,  
Central University of Karnataka,  
Aland Road, Kadaganchi,  
Kalaburagi, Karnataka-585367

### PERSONAL

Date of birth : 30<sup>th</sup> June 1981  
Nationality : Indian  
Postal address : Shri Kshetra Gurumath,  
Baad, Karwar-581304,  
Karnataka.  
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Phone : +919482864378(M)  
Nationality : Indian  
Languages : Kannada, Hindi, English, Konkani, Marathi, Sanskrit (Fluent), Tamil  
(Working knowledge)

### 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

### Spintronics and Magnetism in low dimensional structures

Spintronic Device Development- Simulation and Fabrication, Electro-Magnetic coupling in solids and interfaces. Magnetotransport (AC and DC) in strongly correlated solids .

Micromagnetic simulation of nano-structures, used in spintronic and manganic devices.

### 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.

## Research Projects

Funding agency	Project title	Grants received	Duration
UGC	Study of Magneto Impedance Effect in Ferrite Thin Films.	Rs. 6 Lakh	2 Years
VGST	Development of Magneto-capacitance Effect Based Tunable Capacitors for Spintronic Applications	Rs. 6 Lakh	3 Years
UGC-DAE Consortium	Investigation of Charge Screening effect on Magnetoelectric Coupling Using Polarized Neutrons in Heterostructures	Rs. 12 Lakh	3 Years

## ADMINISTRATIVE EXPERIENCE

Coordinator – Integrated BSc MSc Program 2015 to 2020

Coordinator Innovation Club – 2017 to 2023

Nodal officer – UGC MoU (Admissions 2019 to 2023)

Director, Innovation Incubation Center 2023 –Till date

## WORK EXPERIENCE

- Associate Professor of Physics, at Central University of Karnataka, Kalaburagi, from November 2022
- Visiting Scientist, Department of Material Science and Metallurgy, University of Cambridge 2014
- Assistant Professor of Physics, at Central University of Karnataka, Kalaburagi, from December 2013

- 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 Spintronic device simulation and fabrication and electromagnetic coupling in solids (Indo-European Collaboration).
- Worked on oxide ion conductors, thin film fabrication for Solid oxide fuel cells (SOFCs) application at School energy studies, Kolhapur India for PhD (2005-20010).
- Experience of working on ‘thin film fabrication for Solid oxide fuel cells (SOFCs) at Chemistry division, BARC, Mumbai, for PhD.
- 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 (Noise Measurement) and domain observation**” for the postgraduate degree in Physics (M.Sc.).

## SKILLS

**Thin film fabrication:** Pulsed Laser deposition, Sputtering, Evaporation in Ultra High and High Vacuum(UHV-HV), Chemical Techniques.

**Device Fabrication:** Photo and e-beam lithography, wet processing, masking.

**Simulation:** High frequency device characteristics, micromagnetic simulation.

**Instrumentation:** UHV- HV Chamber constructions, Data acquisition using Lab View and python based tools, High magnetic field (14 T) and low temperature (2 K), magneto-optical experimentation.

**Measurements:** AC-DC magnetotransport, optical measurements at low temperature, Ultra high vacuum and high magnetic field conditions.

## PUBLICATIONS

### International

1. A. K. Swetha, A. Anil Kumar, C. Vishnuvardhan Reddy, **Rajeev Shesha Joshi**, Low Field Giant Magnetoimpedance Effect in TbCo<sub>6.2</sub>, **Journal of Electronic Materials**, 10.1007/s11664-023-10796-x.
2. R Mallikarjun, H Holla, **RS Joshi**, Fabrication and characterization of planar electrolyte gated field effect transistor with magnetic electrodes, **Materials Science in Semiconductor Processing** 168, 107855 (2023).
3. Sukhjot Singh, Jagannath Poojari, Vighneshwar Bhat, R Mallikarjun, Swetha Athikundil Kayakkulam, KP Shinde, JS Park, Y Jo, PS Anil Kumar, **Rajeev Shesha Joshi**, Evaluation of low magnetic field magnetocapacitance effect in Ni–NiO inhomogeneous medium, **Applied Physics A** 129 (10), 681(2023).
4. AK Swetha, T Dash, AK Maharana, KP Shinde, JS Park, Y Jo, RS Joshi, Change of orbital ordering in Fe<sub>3</sub>O<sub>4</sub> probed through low frequency-low magnetic field magnetoimpedance effect mediated by magnetic inhomogeneity, **Journal of Magnetism and Magnetic Materials**, 171235 (2023).
5. V Adimule, VS Bhat, **R Joshi**, S Batakurki, G Hegde, BC Yallur, Enhanced electrical properties of CuO: CoO decorated with Sm<sub>2</sub>O<sub>3</sub> nanostructure for high-performance supercapacitor, **Journal of Solid State Electrochemistry** 27 (2), 511-529 (2023).

6. R Sengupta, RG Pooja, SK Gupta, B Kumar, RS Joshi, Magnetic Surfaces for Photo-Isomerization of Azobenzene Based Polymer Probed Using Magneto Optical Method, **Topics in Catalysis**, 1-7 (2022)
7. R Mallikarjun, A Mohammedi, V Kembhavi, R Joshi, Thermal Grafting of Benzaldehyde for Preparing Catalytically Active Silicon Surface Evaluated by Electrical Methods **Topics in Catalysis**, 1-8 (2022)
8. V Adimule, BC Yallur, M Challa, RS Joshi, Synthesis of hierarchical structured Gd doped  $\alpha$ -Sb<sub>2</sub>O<sub>4</sub> as an advanced nanomaterial for high performance energy storage devices, **Heliyon** 7 (12), e08541 (2021)
9. S Singh, KS Kumar, Y Bitla, B Kori, B Hiremath, M Rampur, **RS Joshi**, Large Low-Magnetic-Field Magnetocapacitance Effect and Spin Accumulation in Graphene Oxide **IEEE Transactions on Magnetics** **58** (2), 1-5 (2021)
10. G. Venkat, D. Venkateswarlu, **R. S. Joshi**, M. Franchin, H. Fangohr, P. S. Anil Kumar, A. Prabhakar, 'Enhanced Spin Wave Propagation in Magnonic Rings by Bias Field Modulation' **AIP ADVANCES** 8 (2018) 056006.
11. Debansu Roy, S Sakshath, Geetanjali Singh, **Rajeev Joshi**, S V Bhat and P S Anil Kumar, 'Investigation on two magnon scattering processes in pulsed laser deposited epitaxial nickel zinc ferrite thin film', **Journal of Physics D: Applied Physics** 48 (2015) 7.
12. Kaustuv Manna, **R. S. Joshi**, Suja Elizabeth, and P. S. Anil Kumar, Evaluation of the intrinsic magneto-dielectric coupling in LaMn<sub>0.5</sub>Co<sub>0.5</sub>O<sub>3</sub> single crystals, **Applied Physics Letters**; 104(20) (2014) 202905-202905-4.
13. AB Salunkhe, VM Khot, MR Phadatar, ND Thorat, **RS Joshi**, HM Yadav, SH Pawar 'Low temperature combustion synthesis and magnetostructural properties of Co-Mn nanoferrites' **Journal of Magnetism and Magnetic Materials** 352(2014)91-98.
14. **R. S. Joshi**, Daniel Sylvinson M.R. and P. S. Anilkumar, 'Anisotropic Low field Magnetoimpedance in (001) Oriented La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> Thin Films', **Journal of Applied Physics** 113 (2013) 17C730.
15. **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
16. **Rajeev Joshi**, R. Mishra, S.H. Pawar, 'Relaxation Studies of Spray Deposited Bi<sub>2</sub>Co<sub>0.1</sub>V<sub>0.9</sub>O<sub>5.35</sub> Solid Electrolyte Thin Films on Stainless-steel Substrate', **Ionics** 15 (2009) 453-458
17. **R.S. Joshi**, R.K. Nimat, S.H. Pawar, 'Synthesis of Fuel Cell Grade Bi<sub>2</sub>Co<sub>0.1</sub>V<sub>0.9</sub>O<sub>5.35</sub> Solid Electrolyte Thin Films.' **Journal of Alloys and Compounds** 1-2 (2009) 461-465
18. P. Senthil Kumar, A.Sakunthala, M. Prabu, M.V. Reddy, **R. Joshi**, Structure and electrical properties of lithium nickel manganese oxide (LiNi<sub>0.5</sub>Mn<sub>0.5</sub>O<sub>2</sub>) prepared by P123 assisted hydrothermal route, **Solid State Ionics**. 2014,01, 267.
19. 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
20. 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.
21. 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.

22. 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.
23. 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.
24. 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.
25. 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

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

### Full paper in Indexed International Proceedings

1. Pallavi B. N, Swetha A K, Rajashree Jaldar, Rajeev Joshi, C Vishnuvardhan Reddy, B G Hegde, Non Arrhenius Magnetotransport and Spin Accumulation in  $\text{CuAlTe}_2$ , **AIP Conference Proceedings** XXX(2023). (In print)
2. A K Swetha, R Mallikarjun and Rajeev S Joshi, Macrospin Resonance and Giant Magnetoimpedance Effect in  $\text{Fe}_3\text{O}_4$  Nanoparticles Observed at High Frequency and Low Magnetic Field, **AIP Conference Proceedings** XXX(2023). (In print)
3. S Singh, P Phulare, A Jyothi, AK Swetha, **RS Joshi**, Defect mediated magnetocapacitance effect in NiO investigated with thermoluminescence effect, **AIP Conference Proceedings** 2369 (1), (2021) 020117
4. AK Swetha, BH Pradeep, R Mallikarjun, S Singh, **RS Joshi**, Polaronic Relaxation and Variable-Range-Hopping Conductivity in  $\text{Fe}_3\text{O}_4$  Nanoparticles, **IOP Conference Series: Materials Science and Engineering** 1124 (1), 012002.
5. R Mallikarjun, S Singh, R Sengupta, K Vaibhavi, **RS Joshi**, Fabrication and characterization of polyaniline based water gated field effect transistor, **AIP Conference Proceedings** 2220 (1), 020118
6. S. Dash, S. Satish, B. Parida, S. Satapathy, N. S. Ipsita, **R. S. Joshi**, 'Micromagnetic Simulation of Static Magnetic Properties and Tuning of Anisotropy Strength in Two Dimensional Square Antidot Elements' **AIP Conference Proceedings** 1942 (2018) 130057.
7. **RS Joshi**, BM Sankarshan, K Mohan Kant, PS Anil Kumar, 'Evidence of low field magnetoimpedance effect in (111) oriented  $\text{Fe}_3\text{O}_4$  thin films' **AIP Conference Proceedings** 1591-1(2014) 1601-1603.

### 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  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> 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 Sm<sub>0.5</sub>Sr<sub>0.5</sub>CoO<sub>3</sub> 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.

### Full paper in 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  $\text{Bi}_2\text{Co}_{0.1}\text{V}_{0.9}\text{O}_{5.35}$  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 Indian physics association, BARC, Mumbai
- 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.
- IEEE, Magnetic Society Membership for 2012-2013, 2017-2018.
- Life member of District Science Center, Karwar, Karnataka.

## EXTRACARICULARS

- Attended National 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 and worked as quiz master at district level.
- Won silver medal in 'Mahabharata' Exams conducted by 'Kannada Seva Pratishtana'.

## 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,

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Professor,

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### 2. Prof. S.H. Pawar

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**3. Prof. B.G. Mulimani**

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