Biodata

1. **Name**: Dr. Satyabrata Patnaik

2. **Mailing address**: Professor, School of Physical Sciences

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3. **Date of Birth**: 3rd May 1969

4. **Research Area**: Experimental Condensed Matter Physics, Material Science; (Superconductivity, Multiferroics, and Topological Materials)

5. **Educational Qualification**:

Degree	University	Year	Subjects
M. Sc.	IIT Delhi	1991	Physics
M. Tech	IIT Kanpur	1993	Nuclear Engg. & Tech.
Ph.D.	IIT Kanpur	2000	Physics

6. **Professional recognition, awards, fellowships received**:

- Fulbright – Nehru Senior Research Fellowship (2011)
- Commonwealth Fellowship, University of Cambridge UK (2009)
- SCOPUS Young Scientist Award (2008)
- DAE Young Achiever Award (2006)
- Merrill – Lynch innovation award (2001)
- National Scholarship (1989 – 1991)
- State Merit Scholarship (1980 -1989)
- Citations for published research work (Google Scholar): **5487**
- H-index: **32**
- I-10 Index: **76**

7. Administrative responsibilities:

- Dean, School of Physical Sciences, JNU (2018-2020)
- Dean, School of Engineering, JNU (January 2020- January2021)
- Chairman, JNU Convocation Committee 2020 and 2022.
- Academic Council member of Raman Research Institute, Bengaluru (2018-)
- Academic Council Member of IUCAA, Pune (2018 -)
- Academic Council Member of College of Military Engineering, Pune (2018-20)
- Board Member of Central University, Punjab (2019- 2022)

8. Theses:

Ph.D. Thesis: Effects of granularity and correlated pinning disorder on vortex dynamics in highly oriented platelets of Bismuth based cuprate superconductors (Supervisor: **Prof. R. C. Budhani**)

M.Tech. Thesis: Field coil specifications for ECRH assisted start up in a TOKAMAK (Supervisors: **Prof. K. Sriram** and **Prof. S. Chaturvedi** (IPR))

M.Sc. Thesis: Characterization studies of iron doped calcium borate glasses (Supervisor Prof. **R. G. Mendiratta**)

9. Details of professional training:

- Associate Researcher, Applied Superconductivity Center, University of Wisconsin-Madison, USA (with Prof. David Larbalestier) 2000 -2002.
- Visiting Scientist, Laboratoire des Physique des solides, Université Paris Sud, Orsay, France (with Prof. Helene Raffy and Marcin Konczykowski) October 1998.

- Academic Staff Fellow, University of Cambridge, Cambridge, UK (with Prof. Judith Driscoll) 2009 – 2010.
- Senior Research Fellow, University of Wisconsin-Madison (With Prof. C. B. Eom) 2011 – 2012
- Visiting Research Professor, Institute of Physics, Chinese Academy of Sciences, Beijing (With Prof. Xingjiang Zhou) June-July 2015.

10**. Details of employment:**

Assistant Professor, School of Physical Sciences, JNU, New Delhi July 2002-August 2008

Associate Professor, School of Physical Sciences, JNU New Delhi Aug 2008-August 2014

Professor, School of Physical Sciences, JNU New Delhi August 2014 -

11**. Courses taught:**

Electromagnetic Theory, Solid State Physics, Special Topics in Condensed Matter Physics, Experimental Physics Lab –I, Physics Lab -III, and Atoms and Molecules.

12**. Ph.D. Thesis supervised:**

1) **Dr. Somdatta Kaushik** (Scientist, UGC-CSR Mumbai)

Thesis Title : Effects of pinning disorder on multiband transport properties of superconducting Magnesium Diboride

2) **Dr. Anil. K. Singh** (Assistant Professor, NIT Rourkela)

Thesis Title: Study of magneto-electric coupling in novel spin frustrated multiferroics

3) **Dr. D. Srikala** (Assistant Professor, Hansraj College, Delhi University)

Thesis title: Synthesis and characterization of magnetic system in Nano-Scale

4) **Dr. Shivjee Singh** (Assistant Professor, Institute of High Pressure Physics, Warsaw, Poland)

Thesis Title: Study of transport and magnetization properties of ferropnictide superconductors.

5) **Dr. Gyaneswar Sharma** (Assistant Professor, Govt. College, Etawa, UP)

Thesis title: Studies on magnetic structure driven ferroelectricity in transition metal oxides

6) **Dr. Jitendra Saha** (RA, Upasala University, Sweden)

Thesis title: Study of multiferroicity in oxide heterostructures

7) **Dr. Shruti** (Assistant Professor, Govt College, Jhansi, UP)

Thesis title: Exploring novel superconductivity in oxy – ferropnictides

8) **Dr. Vishal Maurya** (Assistant Professor, Dayal Singh College, Delhi University)

Thesis title: Synthesis and characterization of superconductors derived from topological insulators.

9) **Dr. Rohtash Kumar** (Assistant Professor, Dayal Singh College, Delhi University)

Thesis Title: Nanostructure-Dielectric properties relationship in Lead-free relaxor ferroelectrics using Transmission Electron Microscopy

10) **Dr. Prakriti Neha** (RA, University of Texas, Austin)

Thesis title: Superconductivity in Pnictides, Selenides and Gallides; New Insights

11) **Dr. Pawan Kumar** (Guest Lecturer, Delhi University)

Thesis Title: Emergent Properties of Dirac and Weyl Semimetals

12) **Dr. Shivani Chaudhary** (Assistant Professor, Hansraj College, Delhi University)

Thesis title: Study of Magnetoelectric Response in Honeycomb Oxides

13) **Dr. Ganesh Gurjar** (Assistant Professor, Ramjas College, Delhi University)

Thesis title: Exploration of Spin Dynamics in YIG Thin Films

14) **Dr. Vipin Nagpal** (Research Associate, Carnegie Mellon University, USA)

Thesis title: Study of Magnetism and Magnetoresistance in Weyl Semimetals

Current Ph.D. students: Mr. Karn Singh Jat, Mr. Amar Dagar, Mr. Mainpal Singh, Ms. Pallavi Saha, Mr. Pradeep Kumar, Ms. Priya Das, Mr. Kunal Yadav, and Mr. Manoj Lamba

13. **Summary of Scientific Contributions:**

Prof. Satyabrata Patnaik and his group (SPG) at JNU are the pioneers in the usage of liquid cryogen free low temperature high magnetic field facility in India. In the recent past, they have developed excellent expertise in growing single crystal flakes of chalcogenide semimetals and intercalated superconductors. Along with regular electrical, thermal, and magnetic characterization, SPG has leadership in the country on three specific characterization techniques; a) temperature dependent RF penetration depth measurement (to decipher condensate pairing mechanism in superconductors), b) high resolution measurement of electric polarization as a function of magnetic field in spin frustrated systems, and c) angle dependent Shubnikov de-Haas Oscillation measurements (to decode 2D Fermi surfaces of semimetals). Overall Prof. Patnaik's scientific contribution has encompassed a large variety of quantum condensed matter problems that include allied fields of Multiferroicity, Superconductivity, Nano scale - magnetism and Transport characteristics of topological systems.

A. Multiferroics :

The sub-area in the broad field of multiferroics where SPG has extensively contributed deals with materials where the electric polarization is caused by magnetic correlations rather than ab-initio non-centro-symmetric crystal structure. In particular, they have studied such effects in frustrated magnetic systems with non-collinear (Dzyaloshinskii-Moria type interaction) and collinear (magnetostriction driven) magnetic orderings.

1. SPG has established substantial magneto-electric coupling in $Bi_2Fe_4O_9$ near room temperature (**Appl. Phys. Lett.** 92, 132910 (2008)). This work on $Bi_2Fe_4O_9$ is highlighted in **Nature-Asia** (http://www.natureasia.com/asia-materials/highlight.php?id=244).
2. SPG's work on magnetic field dependent neutron scattering experiments in hexagonal $YMnO_3$ delineates the dominance of magneto-elastic coupling

over and above magneto-electric coupling in this frustrated magnet (**Phys. Rev. B** 81, 184806 (2010)).

3. SPG has identified a new magnetic field driven ferroelectric phase in spin frustrated $Ni_3V_2O_8$ (**Europhys. Lett**. 86, 57001 (2009)).
4. The central challenge with magnetic structure driven ferroelectricity is that such emergent behaviour remains a low - temperature phenomena (below ~40 K). SPG has provided strong evidence for robust multiferroic effects in a collinear magnetic-chain double perovskite Y_2CoMnO_6 at a temperature range above the industrial benchmark of liquid nitrogen temperature (**Appl. Phys. Lett.** 103**,** 012903 (2013)).
5. Their study on lattice mismatched $YMnO_3$ thin films established that its anti-ferromagnetic correlation is tunable through strain (**J. Appl. Phys.** 106, 014109 (2009)).

B. Superconductivity

Over the last several years SPG has worked extensively on superconducting materials in three generic systems, e.g. Diborides, Oxypnictides, and Bismuth chalcogenides. In strong collaboration with Prof. A. K. Ganguli's Chemistry Lab at IIT Delhi, and Dr. V. P. S. Awana's group at NPL, New Delhi, SPG has published over 30 manuscripts on Oxypnictide and chalcogenide superconductivity. SPG's important works in this field are as follows;

1. Demonstration of enhancement in transition temperature, critical current density and critical fields by simultaneous substitution of Y in place of Ce and F in place of O in the semimetal CeOFeAs. Such multiple benefits are achieved by optimization of three independent parameters; higher chemical pressure, selective tuning of multi-band scattering mechanism and superior vortex pinning properties of Y_2O_3 (**Appl. Phys. Lett**. 95, 262507 (2009)).

2. SPG was the first group to achieve induction of superconductivity due to Co doping in place of Fe in FeAs layers of CeOFeAs (**Solid State Communications** 149, 181 (2009). This is exciting because in cuprates any amount of tinkering in the CuO layers would always destroy superconductivity!
3. Two-fold increase in upper critical field in lanthanum based oxypnictides is achieved by tuning inter and intra band scattering through simultaneous doping of K in place of La and F in place of O (**Europhys. Lett**. 84, 57003 (2008)).
4. Determination of basic superconducting parameters of first BiS_2 based layered oxysulphide $Bi_4O_4S_3$ (**J. Am. Chem. Soc.** 134 16504 (2012)).
5. SPG's current research focuses on the identification of topological superconductivity in metal intercalated Bi_2Se_3 (Phys. Rev. B **Phys. Rev. B., 92,** 020506R (2015). Indeed, with careful muon spin rotation measurements they have been able to establish the predicted $p_x + ip_y$ type order parameter in topological superconductor $Sr_xBi_2Se_3$ (**Phys. Rev. Materials** 3, 074201 (2019). This has significant ramification for its usage as a qubit in quantum computers.

C. Magnetism in Nano-scale

It is well known that robust ferromagnetism at room temperature in cobalt and iron disappears in the nano - scale. Using oxygen passivation techniques, SPG has synthesized and studied exchange bias effects in cobalt nano-spheres and nano-cubes. Their main contribution would be the achievement of about an order of magnitude enhancement in the blocking temperature by exchange biasing ferromagnetic nano-spherical core (Co) with an antiferromagnetic shell (CoO) (**J. Phys. Chem** C 112 36, 13882 (2008), **JNN** 9, 5627 (2009), **JMMM** 324, 2512 (2012)).

D. Magneto-resistance in Weyl and Dirac semimetals

The phenomenon of magneto-resistance finds wide application in industry particularly in the areas of magnetic storage devices and data read-heads. In the recent past, exceptional magneto-resistance has been observed in Weyl and Dirac semimetals such as NbP, WTe_2, TaAs and Cd_3As_2. SPG has reported on the origin of such high magnetoresistnce in NbP (Scientific Report **Scientific Reports**, 7, 46062 (2017)) and *$Co_3Sn_2S_2$ (***Journal of Physics: Condensed Matter** 32 (40), 405602 (2020)). Their most recent work on quasi two dimensional ferromagnet *Fe_3GeTe_2* **Physical Review B** 107 (3), 035115 (2023) shows that one does not need to invoke topological band structure to explain the magneto-resistance aspects. This has led to broader and deeper questions on the linkages between magneto-transport measurements and topological band structure in quantum materials.

14. Infrastructure development

With generous support from UGC and DST we have been able to nucleate a strong material science program at JNU. We have access to polycrystalline, thin film, and single crystal sample growth and varied transport and magnetization characterization over broad range of temperature (300 mK to 700K), Magnetic field (upto 14 Tesla) and pressure (upto 30 kbar). In conjunction with AIRF JNU, we routinely undertake Magneto-resistance, Hall, Specific heat, Thermoelectric power, DC/AC susceptibility, RF penetration depth, Dielectric constant and Electric polarization measurements. Recently we have set up a MOKE and a point contact spectrometer in our lab. We also have in-house access to XRD, HRTEM, SEM/EDAX, and Raman spectroscopy.

15. **Externally funded projects:**

Title	Sponsor	Amount	From Date (Month-Year)	To Date (Month-Year)
Electronic anisotropy of MgB_2	DST	11.3 Lacs	2005	2008
Study of magntoelctric coupling and its correlation with crystal structure in doped and pure $YMnO_3$	UGC-CSR	1.05 Lacs	2008	2010
Study of penetration depth and electronic anisotropy in Oxypnictide superconductors	UGC	11.98 Lacs	2009	2014.
Magneto-transport studies in weyl semimetal and doped topological insulator	DST DERB File no: EMR/2016/003998/PHY	48,14,377.00	28 March 2017	2019
Growth and characterization of thin film devices relevant for genomics and superconductivity applications	UPE II (UGC) Project ID: 129	11,00,000.00	01 April, 2014	2019
Upgradation of metallurgical characterization facilities in CIF-SPS	UPE II (UGC) Project ID: 137	11,00,000.00	01 April 2014	2019
Optimization of Heusler based Nano-composite Materials for Thermoelectric Energy Conversion	INDO-RUSSIAN DST-RFBR	17,00,000.00	January 2019	2021
CONCEPT	DST Nano - Mission	7219155.00	2020	2025

16. **Publications**

Journals

1. *Radio frequency vortex dynamics in oriented platelets of* $(Bi\text{-}Pb)_2Sr_2Ca_2Cu_3O_{10}$ *superconductor,* S. Patnaik, R. C. Budhani, Y.-L. Yang, and M. Suenaga, **Physica C** 309, 221 (1998).
2. *Apparatus for vortex dynamics studies in high* T_c *samples using close cycle refrigerator and RF oscillators*, S. Patnaik, K. J. Singh, and R. C. Budhani, **Review of Scientific Instruments** 70, 1494, (1999).
3. *Anisotropy dominated radio frequency vortex dynamics in* $Bi_2Sr_2CaCu_2O_8$ *thick films on silver tapes,* S. Patnaik, R. C. Budhani, and D. W. Hazelton, **Physica C** 325, 210 (1999).
4. *Effects of granularity and strong pinning on high frequency vortex dynamics in* $(Bi\text{-}Pb)_2Sr_2Ca_2Cu_3O_{10}$ *superconducting platelets,* S. Patnaik, R. C. Budhani, and M. Konczykowski, **Solid State Communications** 113, 109 (2000).
5. *Vortex phases and c-axis correlation in as grown and heavy ion irradiated* $(Bi\text{-}Pb)_2Sr_2Ca_2Cu_3O_{10}$ *superconducting tapes; A Flux transformer study,* S. Patnaik, R. C. Budhani, M. Konczykowski, Y. -L. Yang, and M. Suenaga, **Superconductor Science and Technology** 13, 1 (2000).
6. *Radio frequency vortex dynamics in heavy ion irradiated* $(Bi\text{-}Pb)_2Sr_2Ca_2Cu_3O_{10}$ *superconducting platelets,* S. Patnaik, R. C. Budhani, M. Konczykowski, Y. -L. Yang, and M. Suenaga, **Physica C** 349, 155 (2001).
7. *Local Hall-probe-based susceptometry of* $Tl_2Ba_2CaCu_2O_8$ *epitaxial films: Critical state and flux dynamics in collinear ac and dc mangetic fields*, L. K. Sahoo, S. Patnaik, R. C. Budhani, and W. L. Holstein, **Physical Review B** 63, 214501 (2001).
8. *Examination of current limiting mechanism in monocore Ag/BSCCO tapes with high critical current density*, A. Polyanski, M. Feldman, S. Patnaik, J. Jian, X. Cai, D. Larbalestier, K. DeMorvanville, D. Yu and R. Parrella, **IEEE transactions on Applied Superconductivity** 11, 3269 (2001).
9. *Strongly linked current flow in polycrystalline forms of* MgB_2, D. C . Larbalestier, M. Rikel, L. D. Cooley, A. A. Polyanski, J. Y. Jiang, S. Patnaik, X. Y. Cai, D. M. Feldman, A. Gurevich, A. A. Squitieri, M. T. Naus, C. B. Eom, E. E. Helstrom, R. J. Cava, K. A. Regan, N. Rogado, A. Hayward, T. He, J. S. Slusky, P. Khalifah, I. Inumaru, and M. Haas, **Nature** 410, 186 (2001).
10. *Thin film Magnesium Boride superconductor with very high critical current density and enhanced irreversibilty field*, C. B. Eom, M. K. Lee, J. H. Choi, L. Blenkey, X. Song, L. D. Cooley, M. T. Naus, S. Patnaik, J. Jiang, M. Rikel, A. Polyanskii, A. Gurevich, X. Y. Cai, S. D. Bu, S. E. Babcock, E. E. Hellstrom, D. C. Larbalestier, N. Rogado, K. A.

Regan, M. A. Hayward, T. He, J. S. Slusky, K. Inumaru, M. K. Haas,and R. J. Cava, **Nature** 558, 411 (2001).

11. *Electronic Anisotropy, Magnetic Field-Temperature phase diagram and their dependence on resistivity in c-Axis oriented MgB_2 thin films*, S. Patnaik, L. D. Cooley, A. Gurevich, A. A. Polyanskii, J. Y. Jiang, X. Y. Cai, A. A. Squitieri, M. T. Naus, M. K. Lee, J. H. Choi, L. Belenky, S. D. Bu, J. Letteri, X. Song, D. G. Schlom, S. E. Babcock, C. B. Eom, E. E. Hellstrom, and D. C. Larbalestier , **Superconductor Science and Technology** 14, 315 (2001).
12. *Flux Flow of Abrikosov-Josephson Vortices Along Grain Boundaries in High-Temperature Superconductors,* A. Gurevich, M. S. Rzchowski, G. Daniels, S. Patnaik, D. C. Larbalestier, B. M. Hinaus, F. Carillo, and F. Tafuri, **Physical Review Letters** 88(9), 097001/4 (2002).
13. *Anomalous reentrant inductive response at fractional filling density in heavy in irradiated Bi-2212 tapes*, S. Patnaik and R. C. Budhani, **Advances in Cryogenic Engineering**, 48(B), 986-993 (2002).
14. *Synthesis and Properties of c-axis Oriented Epitaxial MgB2 thin films,* S. D. Bu, D. M. Kim, J. H. Choi, J. Giencke, S. Patnaik, L. Cooley, E. E. Hellstrom, D. C. Larbalestier, And C. B. Eom, **Applied Physics Letters** 81, 1851 (2002).
15. *Interfacial structure of Epitaxial MgB_2 grown on (0001) sapphire,* W. Tian, X. Q. Pan, S. D> Bu, D. M. Kim, J. H. Choi, S. Patnaik and C. B. Eom, **Applied Physics Letters** 81, 685 (2002).
16. *Significant enhancement of irreversibility field in Clear limit bulk MgB_2* , V. Bracinni, L. D. Cooley, S. Patnaik, P. Martrineth, A. Palenzone, A. S. Siri, and D. C. Larbalestier, **Applied Physics Letters** 81, 4577 (2002).
17. *Local measurement of current density by Magneto-Optical current reconstructions in normally and over pressure processed BiSCCO Superconductors,* S. Patnaik, D. M. Feldmann, A. A. Polianskii, Y. Yuan, J. Jiang, X. Y. Cai, E. E. Hellstrom and D. C. Larbalestier, **IEEE Transactions on Applied Superconductivity** 13, 2930 (2003).
18. *Critical current limiting factors in post annealed BiSCCO tapes,* J. Jiang,X. Y. Cai, J. G. Chandler, S. Patnaik, Y. Yuan, A. A. Polianskii, E. E. Hellstrom and D. C. Larbalestier , **IEEE Transactions on Applied Superconductivity** 13, 3018 (2003).
19. *Microstructural and Jc improvements in over pressure processed Ag-Sheathed Bi-2223 tapes,* Y. Yuan, J. Jiang, X. Y. Cai, S. Patnaik, A. A. Polianskii, E. E. Hellstrom, D. C. Larbalestier, R. K. Williams and Y. Huang, **IEEE Transactions on Applied Superconductivity** 13, 2921 (2003).
20. *Very high upper critical fields in MgB_2 produced by selective tuning of impurity scattering,* A Gurevich, S Patnaik, V. Braccinni, K. H. Mielke, X Song, L. D. Coley, S. D. Bu, D. M. Kim, J. H. Choi, L. J. Belenky, J. Giencke, M. L. Lee, W. Tian, X. P. Pan, A.

Siri, E. E. Hellstrom, C. B. Eom, and D. C. Larbalestier, **Superconductor Science and Technology** 17, 278 (2004).

21. *Thermally activated current transport in MgB_2,* S. Patnaik, S. D. Kaushik, A. Gurevich, S. D. Bu, J. Choi, C. B. Eom, D. C. Larbalestier **Physical Review B** 70, 064503 (2004).

22. *Improved upper critical field in bulk-form magnesium diboride by mechanical alloying with carbon,* B. J. Senkowich, J. E. Glincke, S. Patnaik, C. B. Eom, E. E. Hellstrom, D. C. Larbalestier, **Applied Physics Letters,** 86, 202502 (2005).

23. *Modification of intergrain connectivity,upper critical field anisotropy and critical current density in ion irradiated MgB_2 films.* S. D. Kaushik, Ravi Kumar, P. K. Mishra, J. Giencke, C. B. Eom and S. Patnaik, **Physica C**, 442, 73 (2006).
24. *Intergrain connectivity and resistive broadening in the vortex state: a comparison between MgB_2, $NbSe_2$ and $Bi_2Sr_2Ca_2Cu_3O_{10}$,* S. D. Kaushik and S. Patnaik, **IEEE transactions in Applied Superconductivity** 17, 3016 (2007).
25. *Magnetoelectric properties of BixCo2-xMnO4 (0 ≤ x ≤ 0.3),* N Rajeevan , P Pradyumnan , D Shukla , Shalendra Kumar , Sunil Arora , Igor Shvets, A Singh , S. Patnaik, **Appl. Phys. Lett.** 92, 102910 (2008).
26. *Substantial magneto-electric coupling in $Bi_2Fe_4O_9$*, A. K. Singh, S. D. Kaushik, P. K. Mishra, V. Siriguri, B. Kumar and S. Patnaik, **Appl. Phys. Lett**. 92, 132910 (2008).
27. *Cryogen-free low temperature and high magnetic field apparatus, S. D. Kaushik, Anil K. Singh, D. Srikala, and S. Patnaik,* **Ind. Jour. Pure and Appl. Phys** 46, 334 (2008).
28. *Ferromagnetism and metal-semiconducting transition in Fe doped ZnO thin films* Abhinav Singh , Pardeep Thakur , K. Chae , W Choi , Basavaraj Angadi , S Kaushik , and S. Patnaik **J. Phys. D.** 41, 155002 (2008).
29. *Magnetic field dependence of vortex activation energy: A comparison between MgB_2, $NbSe_2$, and $Bi_2Sr_2Ca_2Cu_3O_{10}$*, S. D. Kaushik and S. Patnaik, **Pramana, Journal of Physics** 71, 1335 (2008).
30. *Control of exchange in cobalt nanoparticles by partial oxidation,* D. Srikala, V. Singh, A. Banerjee, B. R. Mehta and S. Patnaik **Jour. of Chem. Phys. C 112,** 36, 13882 (2008).
31. *Synthesis and characterization of cobalt nanospheres, nanocubes and nanodiscs*, D. Srikala, V. Singh, A. Banerjee, and S. Patnaik **Jour. of Nanosci. and Nanotech.** 9, 5627 (2009).
32. *Potassium fluoride doped LaOFeAs multi-band superconductor: Evidence of extremely high upper critical field,* S. J. Singh, J. Prakash, S. Patnaik and A. K. Ganguli, **Europhys. Lett.** 84, 57003 (2008).

33. *Superconductivity at 11.3 K induced by cobalt doping in CeOFeAs* S. J. Singh, J. Prakash, A. K. Ganguli, and S. Patnaik **Solid State Communication,** 149 189 (2009).
34. *Superconductivity at 42.7 K in $CeO_{1-x}F_xFeAs$ with upper critical field of 94 T* J. Prakash, S. J. Singh**,** S. Patnaik and A. K. Ganguli, **Physica C**, 82, 469 (2009).

35. *Enhancement in superconducting transition temperature and upper critical field of LaO0.8F0.2FeAs with antimony doping*, S. J. Singh, J. Prakash, S. Patnaik, and A. K. Ganguli **Superconductor Science and Technology**, 22, 045017 (2009).

36. *Compositionally controlled semimetal to superconducting transition in NaF- doped LaOFeAs: Enhancement in T_c due to Na-doping*, Prakash J, Singh S J, S. Patnaik and Ganguli A K, **Physica C** 469, 300 (2009).
37. *Upper critical field, superconducting energy gaps, and Seebeck coefficient in $La_{0.8}Th_{0.2}OFeAs$*, Prakash J, Singh S J, S. Patnaik and Ganguli A K, **J. Phys. Cond. Mat**., 21, 175705, (2009).
38. *Field dependent competing magnetic ordering in multiferroic $Ni_3V_2O_8$* A. K. Singh, D. Jain, V. Ganeshen, & S. Patnaik, **Europhys. Lett.** 86, 57001 (2009).
39. *Effect epitaxial strain on the magneto-electric coupling of $YMnO_3$ thin films* A. K. Singh, M. Snure, A. Tiwari, and S. Patnaik, **J. Appl. Phys.** 106, 014109 (2009).
40. *Enhancement in transition temperature temperature and upper critical field of $CeO_{0.8}F_{0.2}FeAs$ by yttrium doping*, J. Prakash, S. J. Singh, S. Patnaik and A. K. Ganguli, **Appl. Phys. Lett. 95**, 262507 (2009).
41. *Intragrain electric inhomogenitis and compositional variation of static dielectric constant in $LaMn_{1-x}Fe_xO3$* A. Karmakar, S. Majumdar, A. K. Singh and S. Giri, **J. Phys. D: Appl. Phys.** 42, 092004 (2009).
42. *Superconductivity at 31.3 K in Yb-doped La(O/F)FeAs superconductors* J. Prakash, S. J. Singh, S. Patnaik and A. K. Ganguli, **J. Chem. Sci. 122**, 43(2010).
43. *New oxypnictide superconductor $PrOFe_{1-x}Co_xAs$* J. Prakash, S. J. Singh, S. Patnaik and A. K. Ganguli, **J. Solid State Chem. 183**, 338 (2010).
44. *Role of chemical pressure in enhancing the transition temperature (T_c) and upper critical field (H_{c2}) in the Y-doped Ce-oxyfluoride superconductor* A. K. Ganguli, J. Prakash, S. J. Singh and S. Patnaik**, Eur. Phys. J. B. 73**, 177 (2010).
45. *Yttrium doped $La_{1-x}Y_xO_{0.9}F_{0.1}FeAs$ superconductors: Hall and Thermopower studies* S. J. Singh, J. Prakash, S. Patnaik and A. K. Ganguli, **Physica C** 470, 511 (2010).
46. *Anomalous Raman scattering from phonons and electrons of superconducting FeSe0.82*, P.Kumar, U.Kumar, J. Prakash, A. K. Ganguli, S.Saha, S. Patnaik, U.V. Waghmare, A. K. Sood, **Solid State Communication** 150, 557 (2010).

47. *Coexistence of strong ferromagnetism and polar switching at room temperature in Fe3O4–BiFeO3 nanocomposite thin films,* E. Weal, S. Patnaik, Z. Bi, H. Wang, T. Fix, A. Kursumovic and J. L. MacManus Driscoll, **Appl. Phys. Lett**. 97, 153121 (2010).
48. *Magnetoelectric coupling in Ca_3CoMnO_6,* S. D. Kaushik, S. Rayaprol, J. Saha, N. Mohapatra, V. Siruguri,1 P. D. Babu,S. Patnaik, and E. V. Sampathkumaran **J. Appl. Phys.** 108, 084106 (2010).
49. *Effects of simultaneous charge carrier doping in charge reservoir and conducting layers of superconducting $CeO_{0.9}F_{0.1}Fe_{1-x}Co_xAs$*, S. J. Singh, J. Prakash, S. Patnaik and A. K. Ganguli, **Physica** C 470 1928 (2010).
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