PINTU SINGHA

RG ORCID

CAREER SUMMARY

I am a Material Physics Researcher with over 7 years of expertise in different Thermoelectric Materials and Magnetic Topological Insulators. To pursue research in the field of Experimental Condensed Matter Physics, I have worked as a Doctoral Fellow at Department of Physics, University of Calcutta. Further I worked as Visiting Beamline Scientist at the Indian Beamline (BL-18B), Photon Factory, KEK, Tsukuba, Japan to support the user. As a beamline in-charge, I was responsible for the operation, maintenance and development of BL-18B and user support. After that, I have worked as a Guest faculty at the CRNN, University of Calcutta. Now, I am working as Post-Doctoral Fellow at IISER Thiruvananthapuram, India. I am extremely motivated researcher with good communication skills and proven knowledge in experiments and data analysis. I assure to be a good team player who is reliable, responsible, organized, and always goes the extra mile for the well-being of not only my career but also the organization I work for.

COMPETENCES

Bemline Experience: X-Ray Reflectivity, grazing incidence, X-Ray Scattering, Low and High temperature X-Ray Diffraction, Small and Wide-Angle X-ray Scattering.

Analysis Technique: Thermal transport, Raman Spectroscopy, XRD, Thermopower, Resistivity, Hall carrier concentration, Magnetisation, Magneto-resistance (MR), XRR, SEM, TEM, XPS.

Instrumentation Development: X-ray diffractometer, Low-temperature close-cycle cryostat, Thermopower set-up, Small and Wide-Angle X-ray Scattering synchrotron set-up, XRR setup.

Technical Skills:

- **Sample Synthesis:** Electron-beam lithography; Single and Poly-crystalline samples synthesized by Bridgeman; solid-state melting; Arc melting method; Chemical method: Solvothermal, Hydrothermal; Thin film deposition system: E-B gun and Spin coating, Magnetron Sputtering, CVD.
- **Instrument:** Cryogenic temperature (Low-temperature He Cryostat and Liq N_2), Rapid Induction Hotpress, High-temperature furnaces, Operation, Maintenance and development of synchrotron beam-line instrumentations, Expertise in low-temperature Raman instrument and data analysis, PL, UV-Vis Spectroscopy, FTIR Spectroscopy.
- **Software Demeter:** Origin, MAUD, CasaXPS, FullProf, Labview, ImageJ, Word, PowerPoint, Excel.

Professional Experience

1st June- Till date

Post-Doctoral Fellow: School of Physics, IISER-Thiruvananthapuram, Kerala, INDIA

- Thermoelectric module fabrication and efficiency measurement set up.
- High-temperature thermoelectric materials (GeTe, SnSe based), $GeMnTe_2$
- Thin film thermoelectric materials synthesized by CVD, ALD, Thermal evaporation method
- Topological insulating thermoelectric materials

Teaching Experience:

Dec' 2022 – May' 2023

Guest Professor: Department of Physics, Centre for Research in Nano-science and Nanotechnology (CRNN), University of Calcutta, INDIA

- Thermodynamics
- Optics
- Practical/ Experiments

May 2022-June 2022
&
Oct' 2022-Dec' 2022

Supporting Beamline Scientist: High Energy Accelerator Research Organization – KEK, Photon Factory, X-RAY SCATTERING BEAMLINE, Tsukuba, Japan

- Instrumental development for combined x-ray reflectivity
- Slit alignment and setup beam line
- X-ray reflectivity and X-ray diffuse scattering
- Low and High temperature X-ray Diffraction
- Small and wide-angle X-ray scattering
- Sample environments: wide range of temperature, liquid cell
- User support

Research during Ph.D.

Doctor of Philosophy (Ph. D.) | Department of Physics, University of Calcutta, Kolkata, India

Thesis Title: Thermoelectric and Magneto Transport Property Study of Bismuth Chalcogenides

Systems Studied:

Bi_2Te_3 (Both n-type and p-type), Bi_2Te_3/graphite nanocomposites, Bi_2Te_3/graphite nanocomposites, $Bi_{2-x}(TM)_xTe_3$ [TM= Transition metal], Bi_2Se_3 [Both poly-crystal and single crystal]

Synthesis technique:

Solid State melting, Ball-milling, Solvothermal, Arc melting, E-B gun, Spin coating

Characterization:

Powder X-ray diffraction (both laboratory source and Synchrotron), Raman spectroscopy, Scanning and Transmission electron microscopy (SEM & TEM), Temperature variation of Resistivity, Temperature-dependent Thermopower, Thermal Conductivity, Hall Coefficient, Magneto-resistance (MR), Magnetization.

PUBLICATIONS

1. **"***Investigation of thermoelectric and magnetotransport properties of single crystalline Bi_2Se_3 topological insulator***",** **P. Singha**, S. Das, N. Rana, S. Mukherjee, S. Chatterjee, S. Bandyopadhyay, and A. Banerjee, ***Journal of Applied Physics*** [Id: JAP23-AR-02974R1] (just accepted).
2. *"Transport phenomena of TiCoSb: defect induced modification in the structure and density of states*", S. Mahakal, D. Das, **P. Singha**, A. Banerjee, S. C. Das, S. K. Maiti, S. A. Aravindh and K. Malik, ***Mater. Adv.*** **4**, 4168 (2023).
3. *"Development of substrate engineered Si-<111>/[100] Patterned Features by anisotropic wet etching with Pt/Pt_3Si mask",* S. Mandal, C. Das, S. Sikdar, B. N. Chowdhury, **Pintu Singha**,….S. Chattopadhyay, ***Mater. Chem. Phys***. **291**, 126783 (2022).
4. "*Porosity and functionality: A study on interdependence*", Jayeta Maity, Dipali Roy, **Pintu Singha**, Aritra Banerjee, Tanushree Bala, ***Surface and Interface Analysis*** **54**, 1173 (2022).
5. "*Enhancement of electron mobility and thermoelectric power factor of cobalt-doped n-type Bi_2Te_3*", **Pintu Singha**, Subarna Das, V. A. Kulbashinskii, V. G. Kytin, Sujay Chakravarty, A. K. Deb, S. Bandyopadhyay, Aritra Banerjee, ***International Journal of Energy Research*** **46**, 17029 (2022).
6. "*Observation of of Griffiths-like phase in the quaternary Heusler compound NiFeTiSn*", Snehashish Chatterjee, Saurav Giri, Subham Majumdar, Prabir Dutta, **Pintu Singha** and Aritra Banerjee, ***J. Phys.: Condens. Matter*** **34**, 295803(2022).
7. "*Improvement of thermoelectric performance in Sb_2Te_3/Te composites*", Subarna Das, **P. Singha**, Ramzy Daou, Oleg I. Lebedev, Sylvie Hébert, Antoine Maignan, Aritra Banerjee. ***Physical Review Materials*** **6**, 035401 (2022).
8. "*Block co-polymer template-mediated…TiO_2-Ag composite for photocatalysis*", J. Maity, D. Roy, B. Satpati, **Pintu Singha**, A. Banerjee, and T. Bala, ***Polymer Bulletin*** (2022) [doi no: 10.1007/s00289-022-04170-w]
9. "*Evidence of improvement in thermoelectric parameters of n-type Bi_2Te_3/graphite nanocomposite*", **P. Singha**, S. Das, V. A. Kulbachinskii, V. G. Kytin, A. S. Apreleva, D. J. Voneshen, T. Guidi, A. V. Powell, S. Chatterjee, A. K. Deb, S. Bandyopadhyay, and A. Banerjee, ***Journal of Applied Physics*** **129**, 055108 (2021).
10. "*Emergence of compensated ferrimagnetic state in $Mn_{2-x}Ru_{1+x}Ga$ (x=0.2,0.5) alloys*", S. Chatterjee, P. Dautta, **P. Singha**, S. Giri, A. Banerjee, and S. Majumder, ***Journal of Magnetism and Magnetic Materials*** **532**, 167956 (2021).
11. "*Sb_2Te_3 /graphite nanocomposite: A comprehensive study of thermal conductivity*" S. Das, **P. Singha**, V. A. Kulbachinskii, V.G. Kytin, G. Das, S. Janaky, A .K. Deb, S. Mukherjee, A . Maignan, S. Hebert, R. Daou, C. Narayana, S. Bandyopadhyay, and A. Banerjee, ***Journal of Materiomics*** **7**, 545 (2021).
12. "*Morphology of ZnO triggered versatile catalytic reactions towards CO2 fixation and acylation of amines at optimized reaction conditions*", Atanu Sahoo, A. H. Chowdhury, **Pintu Singha**, Aritra Banerjee, Sk. M. Islamb, Tanushree Bala, ***Molecular Catalysis*** **493**, 111070 (2020).
13. "*Relative humidity sensing properties … multiwall carbon nanotubes: wearable and flexible human respiration monitoring application*", S. Kundu, R. Majumder, R. Ghosh, M. Pradhan, S. Roy, **Pintu Singha**, D. Ghosh, Aritra Banerjee, D. Banerjee, and M. P. Chowdhury, ***J. Materials Science*** **55**, 3884 (2020).
14. *"Role of graphite on the thermoelectric performance of Sb_2Te_3/graphite nanocomposite"*, Subarna Das, **P. Singha**, A. K. Deb, S. C. Das, S. Chatterjee, V. A. Kulbachinskii, V. G. Kytin, D. A. Zinoviev, N. V. Maslov, Sandip Dhara, S. Bandyopadhyay, and Aritra Banerjee, ***Journal of Applied Physics*** **125**, 195105 (2019).

15. *"Thermoelectrical properties of Bi_2Te_3 nanocomposites"*, V. A. Kulbashinskii, V. G. Kytin, N. V. Maslov, **P. Singha**, S. Das, A. K. Deb, and A. Banerjee, ***Materials Today: Proceedings* 8,** 573 (2019).

16. "*Thermoelectric Properties of Sb_2Te_3-Based Nanocomposites with Graphite*", V. A. Kulbachinskii, V. G. Kytin , D. A. Zinoviev, N. V. Maslov, **P. Singha** , S. Das, and A. Banerjee, ***Semiconductors* 53**, 638 (2019).

17. *"Modulation of thermal conductivity and thermoelectric figure of merit by anharmonic lattice vibration in Sb_2Te_3 thermoelectrics",* Diptasikha Das, K. Malik, Subarna Das, **P. Singha**, A. K. Deb, V. A. Kulbachinskii, Raktima Basu, Sandip Dhara, Arup Dasgupta, S. Bandyopadhyay, and Aritra Banerjee, ***AIP Advances* 8**, 125119 (2018).

18. *"Evolution of phonon anharmonicity in Se doped Sb_2Te_3 thermoelectrics"*, Diptasikha Das, Subarna Das, **P. Singha**, K. Malik, A. K. Deb, A. Bhattacharyya, V. A. Kulbachinskii, Raktima Basu, Sandip Dhara, S. Bandyopadhyay, and Aritra Banerjee, ***Physical Review B* 96**, 064116 (2017).

19. "*Electrical characterization of n-ZnO NW/ p-CuO .....varying reaction time*", Somdatta Paul, Jenifar Sultana, Aritra Banerjee, **Pintu Singha**, Anupam Karmakar and Sanatan Chattopadhyay, ***Advances in Optical Science and Engineering*** (2017) [DOI: 10.1007/978-981-10-3908-9_19].

20. *"Structural and ... of Bi_2Te_3+x% graphite nanocomposites",* **Pintu Singha**, Subarna Das, S. Bandyopadhyay, V. A. Kulbashinskii, A. K. Deb, and Aritra Banerjee, ***AIP Conference Proceedings* 1832**, 120029 (2017).

21. *"Effect of Mn dispersion .. . of Sb_2Te_3 based nanocomposite",* Subarna Das, **Pintu Singha**, S. Bandyopadhyay, V. A. Kulbachinskii, A. K. Deb, and Aritra Banerjee, ***AIP Conference Proceedings* 1832**, 110045 (2017).

22. *"Effects of partial substitution of Co by Ni on structural and transport properties of TiCoSb-based half-Heusler compound",* S. Mahakal, D. Das, **P. Singha**,…and K Malik, ***J. Phys. Conf. Ser.* 2349**, 012022 (2022).

KEY CONFERENCE & WORKSHOP

28th October - 1st November 2018, Mumbai, India	"Neutrons as Probes of Condensed Matter (NPCM-XVIII)" held at BARC, Mumbai, India.
2nd - 6th December, 2019, Bengaluru,	"International Winter School 2019 Frontiers in Materials Science" held at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, India
16th to 17th August, 2018, Barasat, India	National Conference on Frontiers in Modern Physics held at Adamas University, Barasat, Kolkata, India
28th February, 2020 Kolkata, India	Invited talk: "Thermoelectric Materials and my current research" at UGC-DAE, Kolkata Centre, India in occasion of National Science day.

NEUTRON & SYNCHROTRON EXPERIENCE

February, 2019 RAL, UK	Visited ISIS *Neutron and Muon source*, STFC, Rutherford Appleton Laboratory, UK to carry out Inelastic Neutron Scattering Experiment using MARI instrument.
May, 2018 & December, 2018, Tsukuba, Japan	Visited Photon Factory, KEK, Japan to carryout temperature dependent powder diffraction experiments using the synchrotron facilities at Indian Beam line, BL-18B, Photon Factory, KEK, Japan.

September, 2016 Moscow, Russia	Visited Department of Low Temperature Physics and Superconductivity, M. V. Lomonosov Moscow State University, Moscow, Russia under collaborative research scheme project

EDUCATION

Ph.D. in Material Physics (Experimental), March, 2023	University of Calcutta, Kolkata, India
M.Sc. in Physics 2013-2015, Percentage: 69.7	University of Calcutta, Kolkata, India
B.Sc. in Physics 2010-2013; Percentage: 71.25	University of Calcutta, Kolkata, West Bengal, India
Class12*th* Board, 2010-2012, Percentage: 80.25	West Bengal council of Higher Secondary Education, India
Class10*th* Board, 2008, Percentage: 91.2	West Bengal council of Higher Secondary Education, India

AWARDS

- Second best poster award in the *National Conference on Frontiers in Modern Physics*, held at Adamas University, Barasat, Kolkata; 16th- 17th August, 2018
- 2010-2013 Merit Cum Means scholarship - Government of West Bengal, India (B.Sc. Physics)
- 2008-2010 Tata Steel Scholarship, India
- 2005-2008 Chief Ministers Scholarship, Government of West Bengal, India

NATIONAL LEVEL EXAMINATION QUALIFIED

CSIR UGC NET

- June'2019 (Rank: JRF 126)
- December' 2018 (Rank: LS 101)
- December' 2017 (Rank: LS 98)
- June' 2015 (Rank: LS 43)
- December' 2014 (Rank: LS 46)
- June' 2014 (Rank: LS 69)

JEST-2015 (Rank 609)

GATE-2015 (Rank 916)