

Dr. Soumya Kanti Hazra

Postdoctoral Researcher, Indian Institute of Technology Patna, India

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Male | Indian | Date of Birth: 14th Oct. 1990

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About Me

With a strong foundation in physics, I transitioned into the interdisciplinary field of renewable energy, driven by a deep commitment to creating a sustainable future. Leveraging my twelve years of experience in materials synthesis and characterization, encompassing optical, electrical, and magnetic properties, I have become adept at exploring cutting-edge solutions for water and energy challenges.

Research Interest

Functional Material | Water-Energy Nexus | Device Fabrication

Education

Doctor of Philosophy (2017 - 2022)
Indian Institute of Technology Kharagpur West Bengal, India

- Department: Cryogenic Engineering | Field (s) of Study: Materials Science, Solar Energy | CGPA: 9.25/10
- Supervisor: **Prof. Tapas Kumar Nandi**
- Thesis title: Studies on photo-thermal conversion of nanofluids and design optimization of volumetric solar collectors

Master of Technology (2013 - 2015)
Indian Institute of Technology Kharagpur West Bengal, India

- Department: Cryogenic Engineering | Field (s) of Study: Materials Science, Cryo-Physics | CGPA: 8.49/10
- Supervisor: **Prof. Venimadhav Adyam**
- Thesis title: Magnetodielectric behavior of Cobalt Ferrite-Lead Zirconate Titanate-PVDF multiferroic nanocomposites

Master of Science (2011 - 2013)
Indian Institute of Technology Kharagpur West Bengal, India

- Department: Physics | Field (s) of Study: Materials Science, Physics | CGPA: 8.05/10
- Supervisor: **Prof. Tapan Kumar Nath**
- Thesis title: Fabrication of thermoelectric power measurement setup to study magnetic oxide material in the temperature range 77-300 K

Bachelor of Science (2008 - 2011)
Jadavpur University West Bengal, India

- Department: Physics | Field (s) of Study: Physics, Chemistry, Mathematics | Score: 72%

Research Experience

Postdoctoral Research Associate (29.08.2022 - Present) **Indian Institute of Technology Patna, India**

Advisor: **Prof. Rishi Raj**, Department of Mechanical Engineering

- Fabrication of experimental setup for single bubble generation during boiling
- Single bubble generation and capturing bubbling acoustics

Doctoral Researcher (03.01.2017 - 11.08.2022) **Indian Institute of Technology Kharagpur, India**

Advisor: **Prof. Tapas Kumar Nandi**, Cryogenic Engineering Centre

- Preparation of nanofluids using different nanofiller and their stability analysis
- Study zeta potential, thermal conductivity, viscosity, dielectric, optical properties of nanofluids
- Design and development of lab scale direct absorption solar collector
- Investigation on photothermal conversion characteristics of carbon black, boron nitride, MoS₂ nanofluids
- Numerical analysis on the performance prediction and design optimization of solar collector

Research Assistant (19.09.2016 - 30.12.2016) **Indian Institute of Technology Kharagpur, India**

Advisor: **Prof. Sudipto Ghosh**, Department of Metallurgical Engineering and Materials Engineering

- Analysis of the microstructure of aluminum-lithium alloy

Research Assistant (03.03.2016 - 30.07.2016) **Aalto University, Finland**

Advisor: **Prof. Sebastiaan Van Dijken**, Department of Applied Physics

- Thin film deposition and optimization of operational parameters
- Fabrication of multiferroic tunnel junctions with junction thickness of 20 nm
- Structural characterization and study resistive switching behavior of tunnel junctions

Post Graduate Fellow (03.06.2014 - 02.05.2015)

Indian Institute of Technology Kharagpur, India

Advisor: **Prof. Venimadhav Adyam**, Cryogenic Engineering Centre

- Synthesis of ferromagnetic (Cobalt Ferrite) nanoparticles and its magnetic characterization
- Synthesis of ferroelectric (Lead Zirconate Titanate) nanoparticles and its electric characterization
- Synthesis and characterization of Cobalt Ferrite-Lead Zirconate Titanate-PVDF based composite materials
- Magnetic, dielectric, magnetodielectric studies of polymer based composite materials

Under Graduate Fellow (03.06.2012 - 12.05.2013)

Indian Institute of Technology Kharagpur, India

Advisor: **Prof. Tapan Kumar Nath**, Department of Physics

- Synthesis of magnetic nanoparticles using sol-gel and solid-state reaction method
- Structural and morphological characterization of these nanoparticles
- Fabrication of thermoelectric measurement setup
- Explore thermoelectric response of various magnetic nanoparticles in the temperature range 77-300 K

Publications

International Journal Publications (*Corresponding author)

1. D. Biswas, Y. B. Singh, **S. K. Hazra**, B. K. Ghosh, A. S. Das, R. Mondal, S. Kabi, L. S. Singh; Influence of Sb doping on thermal properties and electrical conductivity mechanism of $Sb_xSe_{50-x}Sn_{20}Te_{30}$ chalcogenide glassy systems (2024). Journal of Non-Crystalline Solids. 633, 122953. [Link](#)
2. D. Biswas, B. K. Ghosh, A. Das, **S. K. Hazra**, S. Das, R. Mondal, S. Kabi, S. Adhikari; Effect of the iron content on the thermal and dielectric relaxation process of sodium Zinc -Phosphate quaternary glassy systems (2024). Journal of Non-Crystalline Solids. 629, 122882 [Link](#)
3. **S. K. Hazra***, A. M. Saleque, A. K. Thakur, M. N. A. S. Ivan, D. Biswas, S. A. Khan, R. Saidur, Z. Ma, R. Sathyamurthy; Recent advancement in solar-driven interfacial steam generation for desalination: A state-of-the-art review (2024). Energy Technology. 2301190 [Link](#)
4. A. Upadhyay, **S. K. Hazra**, A. Assam, R. Raj; Review of the Current Status and the Potential of Machine Learning Tools in Boiling Heat Transfer (2023). Numerical Heat Transfer, Part B: Fundamentals [Link](#)
5. **S. K. Hazra***, T. K. Nandi; Performance prediction and determination of optimum optical property of the nanofluid for energy storage in direct absorption solar collectors (2023). Applied Thermal Engineering. 233, 121189 [Link](#)
6. S. B. Hota; D. Biswas; **S. K. Hazra**; A. S Das; R. Mondal; S. Kabi; D. Roy; Mixed ionic and electronic conductivity in the quaternary $V_2O_5-Na_2O-ZnO-P_2O_5$ glass system (2023). MTLA. 28, 101777 [Link](#)
7. S. S. Christopher; A. K. Thakur; **S. K. Hazra**; S. W. Sharshir; A. K. Pandey; S. Rahman; P. Singh; L. S. Sunder; A. K. Raj; R. Dhivagar; R. Sathyamurthy; Performance evaluation of external compound parabolic concentrator integrated with thermal storage tank for domestic solar refrigeration system (2023). Environmental Science and Pollution Research [Link](#)
8. A. K. Thakur, R. Sathyamurthy, R. Velraj, R. Saidur, A. K. Pandey, Z. Ma, P. Singh, **S. K. Hazra**, S. W. Sharshir, R. Prabakaran, S. C. Kim, S. Panchal, M. H. Ali; A state-of-the art review on advancing battery thermal management systems for fast-charging (2023). Applied Thermal Engineering. 226, 120303 [Link](#)
9. **S. K. Hazra***, M. Michel, T. K. Nandi; Investigations on optical and photo-thermal conversion characteristics of BN-EG and BN/CB-EG hybrid nanofluids for applications in direct absorption solar collectors (2021). Solar Energy Materials & Solar Cell. 230, 111245 [Link](#)
10. **S. K. Hazra***, S. Ghosh, T. K. Nandi; Photo-thermal conversion characteristics of carbon black-ethylene glycol nanofluids for applications in direct absorption solar collectors (2019). Applied Thermal Engineering. 163, 114402 [Link](#)
11. S. K. Giri, P. T. Das, **S. K. Hazra**, T. K. Nath; Exchange bias effect concerned with tunnelling magnetoresistance in $Sm_{0.35}Pr_{0.15}Sr_{0.5}MnO_3$ phase separated manganites (2013). IEEE Transactions on Magnetics. 50, 1-4 [Link](#)

International Conference Proceedings

1. **S. K. Harza**, S. K. Giri, T. K. Nath; Fabrication of low cost and high precision thermoelectric power setup in the temperature range of 77-300 K (2015). AIP Conf. Proc., 1665, 06013 [Link](#)
2. S. K. Giri, J. Panda, **S. K. Harza**, P. T. Das, T. K. Nath; Enhanced room temperature magnetoresistance in $p-La_{0.7}Ca_{0.3}MnO_3/SrTiO_3/n-Si$ heterostructure: A possible spintronics application (2014). AIP Conf. Proc., 1591, 1639-1641 [Link](#)
3. S. K. Giri, **S. K. Harza**, T. K. Nath; Design and development of low cost thermoelectric power setup in the temperature range of 30-320 K upto a magnetic field of 8T (2013). AIP Conf. Proc., 1512, 456-457 [Link](#)

Certified Course/Training

1. [Fundamentals of scanning electron microscope and its applications](#), Carl Zeiss India Pvt. Ltd
2. [Clean room training and operator licenses](#), Aalto Nanofab and VTT technical research centre of Finland, Espoo, Finland
3. [Gas safety course](#) by the AGA, a Linde group member, Department of Applied Physics, Aalto university, Espoo, Finland
4. [Chemical training](#), Aalto Nanofab and VTT at Micronova, Espoo, Finland

Conference Attended

International

- 9th International Colloids Conference, Barcelona, Spain, 2019 (poster presentation)
- International Conference on Advances in Materials & Materials Processing, IIT Kharagpur, India, 2016 (poster presentation)
- International Conference on Magnetic Material and Applications, IIT Guwahati, India, 2013 (poster presentation)

National

- Advances in Colloidal and Polymeric Systems, Vellore Institute of Technology, India, 2020 (poster presentation)
- 58th DAE Solid State Physics Symposium at Thapar University, India, 2013 (poster presentation)
- 57th DAE Solid State Physics Symposium at IIT Bombay, India, 2012 (poster presentation)

Experimental Skills

- Clean room experience: [VTT Technical Research Centre of Finland](#), [Micronova \(Aalto University, Finland\)](#)
- Thin film deposition: PLD, Sputtering, Spin coating, e-Beam evaporator
- Structural and morphological characterization: XRD, SEM, TEM, AFM, TGA, XPS, BET
- Physical properties characterization: Impedance spectroscopy (LCR meter), Electric (PPMS), Magnetic (SQUID)
- Optical properties characterization: UV-Vis spectroscopy, FTIR, Raman spectroscopy
- Imaging: IR camera (FLIR SC7000), High speed camera (Phantom V410L)
- Instrument fabrication: Thermoelectric, Magnetodielectric, Direct absorption solar collector
- Tools & software: MS office, Origin, Image J, ANSYS Fluent, C++, MATLAB, FullProf

Honours and Awards

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| 1. Ministry of Human Resource Development (MHRD) Doctoral Fellowship | 2017-2022 |
| 2. Ministry of Human Resource Development (MHRD) Post-Graduate Fellowship | 2013-2015 |
| 3. Innovation in Science Pursuit for Inspired Research (INSPIRE) Fellowship | 2008-2013 |

Volunteering

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| • Research scholars' representative from department | 2019-2020 |
| • Regular reviewer of Elsevier, ASME, Springer, Wiley journals | 2019- |
| • Student organizer for IHMTC 2023 at IIT Patna | 2023 |

Membership

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| • Magnetic Society of India (Life time member) | 2013- |
| • American Society of Mechanical Engineers (ASME) | 2024- |