SAMRAT SARKAR

ASSISTANT PROFESSOR OF PHYSICS

Contact Details

+91 9830739454

samratphy09@gmail.com

Hilsa, Nalanda, Bihar

https://scholar.google.co.in/citations?user=8EujUZEAAAAJ&hl=en

https://orcid.org/0000-0001-5670-7492

https://www.linkedin.com/in/samrat-sarkar-45187a97

Work Experience

Feb 2025 - Present
Assistant Professor, Department of Physics, S. U. College, Hilsa (A Constituent Unit of Patliputra University, Patna, India)

Jun 2023 - Jan 2025
Assistant Professor of Physics, Parul University, Vadodara, Gujarat, India

Mar 2022 - May 2023
Assistant Professor of Physics, The Heritage College (Calcutta University), Kolkata, West Bengal, India

Sep 2019 - Aug 2021
Postdoctoral Researcher, Institute for Sustainable Energy, Shanghai University, Shanghai, China
Area of research - Energy storage (Supercapacitors, Na/Li-ion batteries)

Jul 2017 - Mar 2019
Assistant Professor of Physics, St. Thomas College of Engineering and Technology (MAKAUT) Kolkata, West Bengal, India

Aug 2011 - Feb 2012
Assistant Professor of Physics, NSHM Knowledge Campus (MAKAUT), Durgapur, West Bengal, India

Education

2012-2018
Doctor of Philosophy (Materials Science), School of Materials Science and Nanotechnology, Jadavpur University, Kolkata, West Bengal, India
Area of research-Energy harvesting and storage applications of nanomaterials
Thesis title - Investigation on the synthesis and properties of earth abundant metal chalcogenides
PhD Supervisor: Prof. Gopes C. Das (Jadavpur University)

2009-2011
Master of Science (Physics), Banaras Hindu University (IIT BHU), Varanasi, Uttar Pradesh, India
CGPA: 7.81, Percentage: 73.60, First Class

2006-2009
Bachelor of Science (Physics Honours), Durgapur Government College (The University of Burdwan), Durgapur, West Bengal, India
Percentage: 77.25 , First Class **(3rd Rank holder from University)**

2001-2003
Higher Secondary (Pure Science), Bidhan Chandra Institution (WBCHSE), Durgapur, West Bengal, India
Percentage: 82.80, First Class

2001
Secondary, Benachity High School, ICSE (Presently St. Peter's School), Durgapur, West Bengal, India
Percentage: 90.83, First Class

Accomplishments

- Got the **Best Oral Presentation Award** in International Conference (RAINSAT, July 2015) held at Sathyabama University, Chennai, India.
- Qualified as Senior Research Fellow (2014) and Junior Research Fellow (2012) by University Grants Commission, New Delhi, India.
- Qualified in CSIR/UGC NET (National Eligibility Test) **(NET-JRF)** in June 2011 and **(NET-LS)** in December 2011.
- **Third Rank in Bachelor of Science** (Physics Honours, 2009) from the University of Burdwan, India.

About Me

- Being an enthusiastic person, I seek to utilize my skills and abilities in the academic and research field.
- 6 years of teaching experience and 12 years of experience in research.

Expertise

- Teaching and Research
- Computer Skills: Origin, Fortran, Python
- Instrument Operation Skills: X-ray Diffractometer, Raman Spectrometer, Atomic Force Microscope, Electrochemical Workstation.

Teaching and Research Interests

- Condensed Matter Physics
- Quantum Mechanics
- Electromagnetic Theory
- Laser and Fiber Optics
- Materials Science & Nanotechnology
- Supercapacitors, Batteries
- Photocatalysis & Electrocatalysis

References

Prof. Kalyan K. Chattopadhyay

Professor and Head, Department of Physics
AND
Former Director, School of Materials Science and Nanotechnology,
Jadavpur University, Kolkata-700032, India
Email: kalyan_chattopadhyay@yahoo.com
Phone: +91 33 2413 8917, +91 9433389445

Prof. Gopes C. Das

Professor (Retd.), Metallurgical and Material Engineering Department,
Jadavpur University, Kolkata-700032, India
Email: gopesdas@yahoo.co.in
Phone: +91 9433434717, +91 8777545798

Teaching Interests/Methodology

- Broad areas of Pure and Applied Physics according to the UG/PG and Engineering Physics syllabus of Indian Universities.
- Main areas of teaching: **Condensed Matter Physics (Solid-State), Quantum Mechanics, Classical Mechanics, Laser and Fiber Optics, and Electromagnetic Theory**.
- Advanced areas of teaching: Applied areas of Physics like **Materials Science, Energy Harvesting and Storage, Nanotechnology.**
- Interactive teaching methods **(Use of ICT)**, mentoring of students, effective learning with real life examples and problem solving, assignments, periodic assessments for systematic evaluation of students and student feedback for self assessment.

Research Interests

- Synthesis and applications of functional nanomaterials and semiconductor device fabrication.
- Operation and handling of research instruments like **Raman Spectrometer, Atomic Force Microscope, X-ray Diffractometer, Electrochemical Workstation etc.**
- Synthesis of **oxide/chalcogenide compounds, graphene, polymers, TMDs, MOFs, LDHs and fabrication of supercapacitors and Li/Na ion batteries.**
- **Future Interests:** Applications of novel nanomaterials **(topological insulators, topological semimetals)** in various domains.

Research Supervisor/Reviewer/Examiner and Other Assignments

- **Organizing Secretary** of Two-Day National Workshop on Environmental Remediation by Renewable and sustainable Energy-Building a Greener Future (In Association with IAPT), held on May 23 & 24, 2025 at S. U. College, Hilsa (Nalanda), Bihar
- **Principal Investigator (PI)** (Intramural Research Project), Parul University (October 2023), **Title: Harnessing Metal-Organic Frameworks for Energy Storage Applications and Photocatalysis: Unleashing the Efficacy of their Open Architectures.**
- **Co-PI:** (Intramural Research Project), Parul University (July 2024). **Title: Electrocatalytic applications of Atomically Precise Materials.**
- **PhD Supervisor** at Parul University (July 2023).
- **Reviewer of Research Journal (Journal of Materials Science: Materials in Electronics, Springer)**, 7 assignments completed (2019-till date).
- Internal Examiner and Answer Script Evaluator, Maulana Abul Kalam Azad University of Technology, Kolkata.
- Internal Examiner (Theory and Practical), Calcutta University, Kolkata.
- Internal/External Examiner, Paper Setter, Course Coordinator (Physics) at Parul University, Vadodara.
- Assisted M.Sc. and M.Tech. students to complete their research projects and dissertations.
- Assisted Junior PhD scholars with their research work during my PhD/Postdoc tenure.

Research Profiles

- No. of publications in peer reviewed international journals: **25**
- Papers presented in national/international conferences/seminars/workshops: **13**
- Google scholar citations: **1844**, h-index: **18**, i-10 index: **23**
- **ORCID ID:** https://orcid.org/0000-0001-5670-7492
- **Web of Science:** https://www.webofscience.com/wos/author/record/HLP-7668-2023
- **SCOPUS:** https://www.scopus.com/authid/detail.uri?authorId=57217449942
- **Google Scholar:** https://scholar.google.co.in/citations?user=8EujUZEAAAAJ&hl=en
- **Research ID:** https://researchid.co/rid44955

Participation in Faculty Development Programme

- 1st **Faculty Development Program (FDP)** on Density Functional Theory Modelling of Materials: Crystals, Thin Films and Nanomaterials (DFT-M) (Using Quantum Espresso Software Package), organized by the **Centre for Advanced Computational Research, New Delhi** from 11th – 17th March 2024.

- Participated in the **Faculty Induction Programme** organized by **Centre for Human Resource Development (CHRD), Parul University**, 6th to 10th November, 2023, Vadadara, Gujarat.

- Participated in the **Faculty Development Programme** on "Behavioral Remodeling for Enhancing the Classroom Delivery of Teachers" organized by **IIT Guwahati** held from 10 th to 15 th July, 2018 in association with B. P. Poddar Institute of Management and Technology, Kolkata, West Bengal.

Personal and Family Details

- **DOB: 9th September 1983**
- **Languages Known: English, Bengali, Hindi**
- **Hobbies: Music, Cricket**
- **Father: Mr. Dipak Kumar Sarkar** (Private Tutor of Maths and Physics-Retired)
- **Mother: Mrs. Swapna Sarkar** (Home Maker)
- **Wife: Dr. Swagata Roy** (Assistant Professor of Physics), Parul University

List of Publications

1. Self-sacrificial template directed hydrothermal route to kesterite Cu2ZnSnS4 microspheres and study of their photo response properties, Samrat Sarkar, Kaustav Bhattacharjee, G. C. Das and K. K. Chattopadhyay, **CrystEngComm**, 2014, 16, 2634-2644.

2. Optical and thermoelectric properties of chalcogenide based Cu2NiSnS4 nanoparticles synthesized by a novel hydrothermal route, Samrat Sarkar, Biswajit Das, Priyanka R. Midya, G.C. Das and K.K. Chattopadhyay, **Materials Letters**, 2015, 152, 155-158.

3. Novel Quaternary Chalcogenide/Reduced Graphene Oxide-Based Asymmetric Supercapacitor with High Energy Density, Samrat Sarkar, Promita Howli, Biswajit Das, Nirmalya Sankar Das, Madhupriya Samanta, G. C. Das and K. K. Chattopadhyay, **ACS Applied Materials and Interfaces**, 2017, 9, 22652–22664.

4. Flowerlike Cu2NiSnS4 Microspheres for Application as Anodes of Asymmetric Supercapacitors Endowed with High Energy Density, Samrat Sarkar, Promita Howli, Uttam Kumar Ghorai, Biswajit Das, Madhupriya Samanta, Nirmalya Sankar Das and K. K. Chattopadhyay, **CrystEngComm**, 2018, 20, 1443–1454.

5. Recent Advances in Semimetallic Pnictogen (As, Sb, Bi) Based Anodes for Sodium-ion Batteries: Structural Design, Charge Storage Mechanisms, Key Challenges and Perspectives, Samrat Sarkar, Swagata Roy, Yufeng Zhao, Jiujun Zhang, **Nano Research**, 2021, 14, 3690-3723.

6. Recent Progress in Amorphous Carbon-based Materials for Anodes of Sodium-ion Batteries: From Synthesis Strategies, Mechanisms to Performance, Samrat Sarkar, Swagata Roy, Yanglong Hou, Shuhui Sun, Jiujun Zhang, Yufeng Zhao, **ChemSusChem**, 2021, 14, 3693-3723.

7. rGO Wrapped Flowerlike Bi2Se3 Nanocomposite: Synthesis, Experimental and Simulation Based Investigation on Cold Cathode Applications Biswajit Das, Samrat Sarkar, Rimpa Khan, Saswati Santra, Nirmalya Sankar Das and Kalyan Kumar Chattopadhyay, **RSC Advances**, 2016, 6, 25900-25912.

8. Pseudo first ordered adsorption of noxious textile dyes by low-temperature synthesized amorphous carbon nanotubes, D. Banerjee, P. Bhowmick; D. Pahari, S Santra, S. Sarkar, B Das, K. K. Chattopadhyay, **Physica E**, 2017, 87, 68-76.

9. Defect induced tuning of photoluminescence property in graphitic carbon nitride nanosheets through synthesis conditions
D. Das, D. Banerjee, D. Pahari, U.K. Ghorai, S. Sarkar, N. S. Das and K. K. Chattopadhyay, **Journal of Luminescence**, 2017, 185, 155-165.

10. Topological insulator Bi2Se3 / Si nanowires-based p-n junction diode for high performance near infrared photodetector
Biswajit Das, Nirmalya S. Das, Samrat Sarkar, Biplab K. Chatterjee and Kalyan K. Chattopadhyay, **ACS Applied Materials and Interfaces**, 2017, 9, 22788–22798.

11. Co3O4 nanowires on flexible carbon fabric as a binder free electrode for all solid-state symmetric supercapacitor, Promita Howli, Swati Das, Samrat Sarkar, Madhupriya Samanta, Karamjyoti Panigrahi, Nirmalya Sankar Das and Kalyan Kumar Chattopadhyay, **ACS Omega**, 2017, 2 (8), 4216–4226.

12. Band Edge Tuned ZnxCd1-xS Solid Solution Nanopowders for Efficient Solar Photocatalysis, Shrabani Ghosh, Samrat Sarkar, Dipayan Sen, Madhupriya Samanta and Kalyan Kumar Chattopadhyay, **Physical Chemistry Chemical Physics**, 2017,19, 29998-30009.

13. Ultrasound assisted catalytic degradation of textile dye under the presence of reduced Graphene Oxide enveloped Copper Phthalocyanine nanotubes, Madhupriya Samanta, Moumita Mukherjee, Uttam K Ghorai, Samrat Sarkar, Chayanika Bose and K. K. Chattopadhyay, **Applied Surface Science**, 2018, 449, 113-121.

14. Flexible, transparent resistive switching device based on topological insulator Bi2Se3- organic composite, Biswajit Das, Pranab Sarkar, Nirmalya Sankar Das, Samrat Sarkar, and Kalyan Kumar Chattopadhyay, **Journal of Applied Physics**, 2018, 124, 124503.

15. Challenges and opportunities for supercapacitors, Shifei Huang, Xianglin Zhu, Samrat Sarkar, and Yufeng Zhao, **APL Materials**, 2019, 7, 100901.

16. Bi3TaO7film: a promising photoelectrode for photoelectrochemical water splitting, Qinggong Song, Peidong Wu, Samrat Sarkar, Yufeng Zhao and Zhifeng Liu, **Dalton Transactions**, 2020, 49, 147-155.

17. Recent Progress in Advanced Organic Electrode Materials for Sodium-Ion Batteries: Synthesis, Mechanisms, Challenges and Perspectives, Xiuping Yin, Samrat Sarkar, Shanshan Shi, Qiu-An Huang, Hongbin Zhao, Liuming Yan, Yufeng Zhao, and Jiujun Zhang, **Advanced Functional Materials**, 2020, 30, 1908445.

18. Hierarchical Assembly of MnO2 Sheet on CuCo2O4 Flake over fabric scaffold for Symmetric Supercapacitor, Kausik Chanda, Soumen Maiti, Samrat Sarkar, Partha Bairi, Subhasish Thakur, Kausik, Sardar, Nripen Besra, Nirmalya Das, Kalyan Chattopadhyay, **ACS Applied Nano Materials**, 2021, 4, 1420–1433.

19. Enhanced electron emission from ternary solid solution-MWCNT hybrid with theoretical validation, Shrabani Ghosh, Supratim Maity, Ankita Chandra, Bikram Kumar Das, Nripen Besra, Samrat Sarkar, Sourav Sarkar and Kalyan Kumar Chattopadhyay, **Materials Science in Semiconductor Processing**, 2021, 127, 105674.

20. A Review of Carbon Dots and Their Composite Materials for Electrochemical Energy Technologies, Yiming Liu, Swagata Roy, Jiaqiang Xu, Samrat Sarkar, Yufeng Zhao, Jiujun Zhang, **Carbon Energy**, 2021, 3, 795-826.

21. Photocatalytic and sonocatalytic dye degradation by sulfur vacancy rich ZnS nanopowder, Shrabani Ghosh, Madhupriya Samanta, Dipayan Sen, Samrat Sarkar, Sourav Sarkar, K. K. Chattopadhyay, **Journal of Nanoparticle Research**, 2021, 23, 1-12.

22. Interface engineering of FeCo-Co structure as bifunctional oxygen electrocatalyst for rechargeable zinc-air batteries via alloying degree control strategy, Lianghao Song, Jing Zhang, Samrat Sarkar, Chenfei Zhao, Zhenwei Wang, Chengyu Huang, Liuming Yan, Yufeng Zhao, **Chemical Engineering Journal**, 2022, 433, 133686.

23. A novel Mo8.7Nb6.1Ox@NCs egg-nest composite structure as superior anode material for lithium-ion storage, Shuling Cheng, Xiuping Yin, Samrat Sarkar, Zhenwei Wang, Qiuan Huang, Jiujun Zhang, Yufeng Zhao, **Rare Metals**, 2022, 41, 2645-2654.

24. One-Pot Solvothermal Route to Stannite-like Cu2CoSnS4 Microspheres as Pseudocapacitive Material for Electrochemical Energy Storage, Samrat Sarkar, Ratna Sarkar, Shankar Roy, Kalyan Kumar Chattopadhyay, **Solid State Sciences**, 2024, 154, 107601.

25. From Graphene to Exotic Nanocarbons – A Review of Carbon-based New-Generation Supercapacitors, Sarkar et al., (Manuscript Communicated), May 2025.

Participation in Seminars, Conferences and Workshops

1. UGC sponsored state level seminar on Human Rights, 13th and 14th August, 2007, Durgapur Government College, Durgapur, West Bengal.

2. State level seminar on Popularization of Science and Conservation Awareness, 24th and 25th March, 2008, Durgapur Government College, Durgapur, West Bengal.

3. Workshop on Equality-Inequality in India : Through the lens of gender, 22nd August, 2008, Cell for Gender Sensitization and Sexual Harressment Protection and Durgapur Government College, Durgapur, West Bengal.

4. National Seminar on New Era in Nuclear and Particle Physics, NENPP-08, 28th and 29th November, 2008, Department of Physics, The University of Burdwan, West Bengal, Sponsored by: Department of Atomic Energy, Board of Research in Nuclear Sciences (DAE-BRNS), Government of India.

5. National Conference on Sustainable Development through Innovative Research in Science and Technology, 28th and 29th September, 2012, Jadavpur University, Kolkata, West Bengal (Under DST-PURSE Programme).

6. Two Days Workshop on Materials Characterization Technique (Phase Transformation and Product Characterization), 4th and 5th October, 2016, Jadavpur University, Kolkata, West Bengal (Centre of Excellence, TEQIP-II).

7. Two Days Workshop on "Concepts of Mathematics, Probability and Statistics Using Python Libraries", 1st and 8th July, 2023, Department of Applied Sciences and Humanities, Parul Institute of Engineering and Technology, Parul University, Vadodara, Gujarat.

8. Adhigam Aayam - An International Symposium on Innovative Learner - Centered Approaches to Teaching & Learning, held on 26th July, 2023 organized by Internal Quality Assurance Cell (IQAC), Parul University, Vadodara, Gujarat.

9. Sustainability Workshop on Green Hydrogen: Powering Industries Towards Net-Zero Emissions, held from 31st July 2023 to 05th August 2023, Nano Science and Technology Consortium (NSTC), Noida, Uttarpradesh.

10. 3rd Satyendra Nath Bose Memorial Lecture-2024 on "The road to quantum gravity" by Professor Subir Sarkar organized by the Department of Physics, School of Basic and Applied Sciences, Adamas University Kolkata, on 16th March, 2024.

Paper Presentations in National/International Conferences and Seminars

1. Novel Cu2ZnSnS4 nanostructures by a facile route for light harvesting application, Samrat Sarkar and K. K. Chattopadhyay, CM Days, 27-29 August 2014, University of Calcutta, Kolkata, West Bengal; (National).

2. Optical and field emission properties of Cu2ZnSnS4 powder samples synthesized through facile solvothermal routes, Samrat Sarkar and K. K. Chattopadhyay, ICRANN, 15-16th December 2014, Jawaharlal Nehru University, New Delhi; (International).

3. Size dependent optical properties of solvothermally synthesized Cu2ZnSnS4 nanoparticles, Samrat Sarkar and K. K. Chattopadhyay, RAINSAT, 8-10th July 2015, Sathyabama University, Chennai, Tamil Nadu; (International); **(Received Best Oral Presentation Award).**

4. Facile hydrothermal route to novel Cu2NiSnS4 nanoparticles for potential application in photovoltaics, Samrat Sarkar and K. K. Chattopadhyay, ICANN, 8-11th December 2015, IIT Guwahati, Assam; (International).

5. Surfactant assisted solvothermal route to Cu2MSnS4 (M=Zn, Fe, Ni) microspheres for potential application in photovoltaics, Samrat Sarkar and K. K. Chattopadhyay, ICEFN, 27-29th March 2016, Kumaun University, Nainital, Uttarakhand; (International).

6. Temperature evolved transport properties of rGO-Bi2Se3 nanocomposite for future thermo-power applications, Biswajit Das, Samrat Sarkar and K. K. Chattopadhyay, Some Recent Trends in Research in Physics, SRTRP, 21st March, 2016, Jadavpur University , Kolkata, West Bengal; (National Seminar).

7. Surfactant assisted synthesis of ZnxCd1-xS microspheres for application in dye degradation under visible light irradiation
Shrabani Ghosh, Samrat Sarkar, K. K. Chattopadhyay, Recent Advances in Materials Science, Ramakrishna Mission Vidyamandira, Belur Math, Howrah, West Bengal; (National).

8. ZnxCd1-xS Solid Solutions with Cubic Zinc Blende Structure for Application in Organic Dye Degradation Under Natural Sunlight Irradiation, Shrabani Ghosh, Samrat Sarkar, K. K. Chattopadhyay, NCoN:M&A, 16-17th June 2016, Jadavpur University, Kolkata, Kolkata; (National).

9. High Performance Asymmetric Supercapacitor Based on Earth Abundant Metal Chalcogenide Cu2NiSnS4 Synthesized with Controlled Morphology, Samrat Sarkar and Kalyan Kumar Chattopadhyay, National Conference on Recent Developments in Nanoscience and Nanotechnology (NCRDNN), 29-31st January, 2019, Jadavpur University, Kolkata, West Bengal; (National).

10. *In-situ* growth of Cu2NiSnS4 nanoparticles on 2D reduced graphene oxide for application in solid-state asymmetric supercapacitors, Samrat Sarkar and Kalyan Kumar Chattopadhyay, One-day International Conference on Non-Conventional Renewable Energy: Impact on Environment, 8th April, 2023, Ramakrishna Mission Residential College, Narendrapur, Kolkata, West Bengal; (International).

11. Cu2NiSnS4 based composites for asymmetric supercapacitors: Achieving high energy density and exploring the potential for photovoltaic integration, Samrat Sarkar and Kalyan Kumar Chattopadhyay, International Conference on Materials for Energy & Sustainable Development, 27-29 October 2023, School of Physical Sciences, Jawaharlal Nehru University, New Delhi (International).

12. Morphology and Size Dependent Cold Cathode Emission in Solvothermally Synthesized Cu2ZnSnS4 Nanostructures, Samrat Sarkar and Kalyan Kumar Chattopadhyay, International Conference, Energy and Environmental Materials (E2M-2024), 11th-13th June 2024, IIT Indore, Indore, Madhya Pradesh, India.

13. Dual-Functional ZnxCd1-xS: A Promising Heterogenous Photocatalyst for Dye Degradation and Hydrogen Evolution, Samrat Sarkar, Shrabani Ghosh and Kalyan Kumar Chattopadhyay, National Conference, 4th National Symposium on Frontiers in Heterogenous Catalysis (HETCAT-2024), 4th and 5th October 2024, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat.

Declaration

I do hereby declare that all the statements made above are true and correct to the best of my knowledge and belief.

Dr. Samrat Sarkar
Hilsa, Bihar, India