

Samrat Sarkar

Assistant Professor, Department of Physics, S. U. College, Hilsa, Nalanda
(A Constituent Unit of Patliputra University, Patna, Bihar, India)

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An academic and researcher with 12+ years of research experience and over 6 years of undergraduate teaching. Expertise in the synthesis and characterization of functional nanomaterials for electrochemical energy storage, including supercapacitors, metal-ion batteries, and electrocatalysis. Actively integrates experimental research with effective teaching to advance materials science and physics education. Strong publication record in reputed international journals, with regular peer-review activity and conference participation.

Education

Degree	Institution	Year and Details
Ph.D. (Materials Science)	Jadavpur University, Kolkata, West Bengal, India	2012–2018 <i>Thesis Title: Investigation on the synthesis and properties of earth-abundant metal chalcogenides.</i>
M.Sc. (Physics)	Banaras Hindu University, Varanasi, Uttar Pradesh, India	2009–2011 CGPA: 7.81 (73.60 %)
B.Sc. (Physics Hons.)	Durgapur Government College, University of Burdwan, India	2006–2009 77.25 % (3 rd Rank in University)
Higher Secondary (Science)	Bidhan Chandra Institution, Durgapur (WBCHSE), West Bengal	2003, 82.80 %
Secondary	Benachity High School (ICSE), Durgapur, West Bengal	2001, 90.83 %

Postdoctoral Research: Institute for Sustainable Energy, College of Sciences, Shanghai University, Shanghai, China, Sep 2019 – Aug 2021, **Research Area:** Metal-ion batteries and Supercapacitors.

Academic and Teaching Experience:

Position	Institution	Duration
Assistant Professor of Physics, NEP and IQAC Coordinator	S. U. College, Hilsa, Nalanda (Patliputra University, Patna, Bihar, India)	Feb 2025 – Present
Assistant Professor of Physics	Parul University, Vadodara, Gujarat, India	June 2023 – Jan 2025
Assistant Professor of Physics (Part-Time)	The Heritage College (Calcutta University), Kolkata, West Bengal, India	Mar 2022 – May 2023
Assistant Professor of Physics	St. Thomas College of Engineering and Technology (MAKAUT), Kolkata, West Bengal, India	Jul 2017 – Mar 2019
Assistant Professor of Physics	NSHM Knowledge Campus (MAKAUT), Durgapur, West Bengal, India	Aug 2011 – Feb 2012

Teaching Interests

- Over 6 years of teaching experience in Physics at the UG level.
- Courses taught: Quantum Mechanics, Classical Mechanics, Condensed Matter Physics, Quantum Optics, and Electromagnetic Theory.
- Advanced teaching areas: Nanotechnology and Materials Science.

Research Interests

- Functional nanomaterials for energy storage (Supercapacitors, Na/Li-ion batteries) and Electrocatalysis.
- Oxide and chalcogenide nanostructures, graphene, polymers, and hybrid composites.
- Operation of characterization instruments (XRD, Raman, UV-Vis, AFM, and Electrochemical Workstation).

Research Profile

- No. of publications in peer-reviewed international journals: **26**
- Total citations (Google Scholar): **2238**, h-index: **19**, 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>
- Google Scholar: <https://scholar.google.co.in/citations?user=8EujUZEAAAAJ&hl=en>
- Vidwan-ID: **605298**



Fellowships, Research Grants and Awards

- **AUC Research Proposal** at Inter-University Accelerator Centre (IUAC), New Delhi as Co-Principal Investigator (AUC-80307&80503); *Title: Advanced Ion Beam-Assisted Defect and Porosity Engineering of NiCo₂O₄ and Bio-Carbon Electrodes for Energy Storage and Electrochemical Water Splitting.* ONGOING.
- **CSR Project Proposal** at UGC-DAE Consortium for Scientific Research (Indore Centre) as Co-Principal Investigator (Proposal Number: CRS/2025-26/2374); *Title: Development of Supercapacitor Electrode Based on Magnetic Materials Using Low-Cost Chemical Methods.* ONGOING.
- **Intramural Research Grant:** *Harnessing metal-organic frameworks for energy storage applications and photocatalysis: unleashing the efficacy of their open architectures.* 13th September 2023 to 12th September 2025. Total Grant - Rs. 3,00,000 (3 lakhs only), associated with Parul University. (Principal Investigator). COMPLETED.
- Got the **Best Oral Presentation Award** in the International Conference (RAINSAT, July 2015) held at Sathyabama University, Chennai, India.
- Qualified as Senior Research Fellow (2014) and Junior Research Fellow (2012) by the 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) from the University of Burdwan, India.

Seminar/Workshop

- Participation in the Workshop on Low-energy Ion Implantation and Irradiation, 27th August 2025, held at Inter-University Accelerator Centre (IUAC), New Delhi, India.
- **Event Coordinator** in Multidisciplinary Academic Talent Hunt 2025, 13th August 2025, at S.U. College, Hilsa, Nalanda.
- **Organizing Secretary** of Two-Day National Workshop on Environmental Remediation by Renewable and Sustainable Energy-Building a Greener Future, 23rd and 24th May, 2025, at S.U. College, Hilsa, Nalanda.

Membership and Other Assignments

- Life Member of **SMC (Society of Materials Chemistry)** Membership Number: LM2862
- Life Member of **IAPT (Indian Association of Physics Teachers)** Membership Number: L9462
- Reviewer - Journal of Materials Science: Materials in Electronics (Springer), J. Power Sources (Elsevier) and others.

Research Publications

1. Self-sacrificial template directed hydrothermal route to kesterite $\text{Cu}_2\text{ZnSnS}_4$ microspheres and study of their photo response properties
Samrat Sarkar, Kaustav Bhattacharjee, G. C. Das and K. K. Chattopadhyay, **CrystEngComm**, 2014, 16, 2634-2644. (ISSN: 1466-8033, IF: 2.4)
2. Optical and thermoelectric properties of chalcogenide based $\text{Cu}_2\text{NiSnS}_4$ 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. (ISSN: 0167-577X, IF: 2.6)
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. (ISSN: 1944-8244, IF: 7.8)
4. Flowerlike $\text{Cu}_2\text{NiSnS}_4$ 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. (ISSN: 1466-8033, IF: 2.4)
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. (ISSN: 1998-0124, IF: 9.4)
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. (ISSN: 1864-5631, IF: 5.9)
7. rGO Wrapped Flowerlike Bi_2Se_3 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. (ISSN: 2046-2069, IF: 6.1)
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. (ISSN: 1386-9477, IF: 2.5)
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. (ISSN: 0022-2313, IF: 3.8)
10. Topological insulator Bi_2Se_3 / 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. (ISSN: 1944-8244, IF: 7.8)
11. Co_3O_4 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. (ISSN: 2470-1343, IF: 5.2)
12. Band Edge Tuned $\text{Zn}_x\text{Cd}_{1-x}\text{S}$ 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. (ISSN: 1463-9076, IF: 3.0)
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. (ISSN: 0169-4332, IF: 6.6)
14. Flexible, transparent resistive switching device based on topological insulator Bi_2Se_3 - organic composite
Biswajit Das, Pranab Sarkar, Nirmalya Sankar Das, **Samrat Sarkar**, and Kalyan Kumar Chattopadhyay, **Journal of Applied Physics**, 2018, 124, 124503. (ISSN: 0021-8979, IF: 2.7)

15. Challenges and opportunities for supercapacitors
Shifei Huang, Xianglin Zhu, **Samrat Sarkar**, and Yufeng Zhao, **APL Materials**, 2019, 7, 100901. (ISSN: 2166-532X, IF: 4.5)
16. Bi₃TaO₇ film: a promising photoelectrode for photoelectrochemical water splitting
Qinggong Song, Peidong Wu, **Samrat Sarkar**, Yufeng Zhao and Zhifeng Liu, **Dalton Transactions**, 2020, 49, 147-155. (ISSN: 1477-9226, IF: 3.3)
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. (ISSN: 1616-301X, IF: 19.9)
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. (ISSN: 2574-0970, IF: 5.8)
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. (ISSN: 1369-8001, IF: 5.2)
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. (ISSN: 2367-9368, IF: 21.4)
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. (ISSN: 4578-9037, IF: 3.5)
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. (ISSN: 1385-8947, IF: 12.5)
23. A novel Mo_{8.7}Nb_{6.1}O_x@NCs egg-nest composite structure as superior anode material for lithium-ion storage
Shuling Cheng, Xiuping Yin, **Samrat Sarkar**, Zhenwei Wang, Qian Huang, JiuJun Zhang, Yufeng Zhao, **Rare Metals**, 2022, 41, 2645-2654. (ISSN: 1867-7185, IF: 12.1)
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. (ISSN: 1293-2558, IF: 3.6)
25. Electrodeposited Zn-Doped Co₃O₄ Thin Films on Stainless Steel as Binder-Free Pseudocapacitive Electrodes for Supercapacitors, Kumar, Aman Kumar, **Samrat Sarkar**, Roupaya Gopal Ghosh, Santosh Kumar, Ayan Mukherjee, **Journal of Materials Engineering and Performance**, 2026, 1544-1024, <https://doi.org/10.1007/s11665-026-13513-x> (ISSN: 1544-1024, IF: 2.6)
26. Earth-Abundant Cu₂MnSnS₄ Nanospheres for High-Performance Supercapacitive Energy Storage and Oxygen Evolution Reaction, **Samrat Sarkar**, Swagata Roy, Dipayan Roy, Ayan Mukherjee, Promita Howli, Kalyan K. Chattopadhyay, **ChemistrySelect**, 2026; 11:e07509, <https://doi.org/10.1002/slct.202507509> (ISSN: 2365-6549, IF: 2.3)

Papers Presented in Conferences

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 $\text{Cu}_2\text{NiSnS}_4$ 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 Cu_2MSnS_4 (M=Zn, Fe, Ni) microspheres for potential application in photovoltaics, **Samrat Sarkar** and K. K. Chattopadhyay, **ICEFN, 27-29 March 2016**, Kumaun University, Nainital, Uttarakhand; (International).
6. Temperature evolved transport properties of $\text{rGO-Bi}_2\text{Se}_3$ 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 $\text{Zn}_x\text{Cd}_{1-x}\text{S}$ 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) (**Published in Proceedings**).
8. $\text{Zn}_x\text{Cd}_{1-x}\text{S}$ 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, West Bengal; (National).
9. High Performance Asymmetric Supercapacitor Based on Earth Abundant Metal Chalcogenide $\text{Cu}_2\text{NiSnS}_4$ 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 $\text{Cu}_2\text{NiSnS}_4$ 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. $\text{Cu}_2\text{NiSnS}_4$ -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 $\text{Cu}_2\text{ZnSnS}_4$ Nanostructures, **Samrat Sarkar** and Kalyan Kumar Chattopadhyay, **International Conference, Energy and Environmental Materials (E2M-2024), 11th-13th June 2024**, IIT Indore, Indore, Madhya Pradesh (International).
13. Dual-Functional $\text{Zn}_x\text{Cd}_{1-x}\text{S}$: 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 (National Symposium).
14. Hierarchical Ni-Co LDH/N-doped Carbon Spheres as Electrode Materials of High-Energy Asymmetric Supercapacitors, **Samrat Sarkar**, Kausik Chanda, Kalyan Kumar Chattopadhyay, **RABAMS 2025, 18th-19th September, 2025**, Dept. of Chemistry & Physics, TPS College, Patna, Bihar (International Seminar).
15. Morphology Engineered Cobalt-based Nanostructures for Flexible and High-Performance Supercapacitor Devices, **Samrat Sarkar**, Promita Howli, Kalyan Kumar Chattopadhyay, **SoPhyC 2025, 11th-14th October, 2025**, Department of Chemistry, IIT Patna, Bihar (International) (INVITED TALK).
16. Earth-Abundant Kesterite-Type Chalcogenides for Bifunctional Energy Applications, **Samrat Sarkar**, Kalyan Kumar Chattopadhyay, **2nd RDAMSE 2026, 7th - 8th May, 2026**, Department of Basic Sciences and Humanities, Surtech, Kolkata, West Bengal (International) (INVITED TALK).

References

- **Prof. Kalyan Kumar Chattopadhyay**, Professor and Head, Department of Physics, Jadavpur University, Kolkata, West Bengal, India. Email: kalyan_chattopadhyay@yahoo.com, Phone: 033 24138917, 09433389445.
- **Prof. Gopes Chandra Das**, Retd. Professor, Metallurgical and Materials Engg. Department, Jadavpur University, Kolkata, West Bengal, India. Email: gopesdas@yahoo.co.in, Phone: 09433434717.

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, Nalanda, Bihar, India