Samir Kumar Pal

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Guidance of Students/Post-Docs/Scientists

a) Ph.D. Students

1. Damayanti Bagchi; Spectroscopic and Microscopic Studies on Nanohybrids of Inorganic Metal-oxides with Medicinally Important Organic Ligands; Awarded
2. Probir Sarkar; Spectroscopic Studies on Molecules and Nanomaterials for Potential Applications in Medical Diagnosis and Environmental Pollution Monitoring; Awarded
3. Priya Singh; Spectroscopic Studies on Structure, Function and Dynamics of Biological Macromolecules in Physiologically Relevant and Engineered Environments; Awarded
4. Jayita Patwari; Photophysical Studies on Light Harvesting Nanomaterials for Improved Solar Energy Conversion; Awarded
5. Tuhin Maji; Combined experimental and computational investigation on optical and catalytic properties of functionalized metal oxides; Thesis submitted; Dr. Debjani Karmakar, HBNI, BARC (Co-supervisor)
6. Aniruddha Adhikari; Studies on Therapeutic Potential of Various Nanomaterials and Ethnobotanical Ingredients in Preclinical Disease Model; Thesis submitted
7. Soumendra Singh; Development of Spectroscopic Techniques for Potential Environmental and Biomedical Applications; Thesis submitted
8. Animesh Halder; Development and Validation of Optical Methodologies for Potential Biomedical and Environmental Applications; Thesis submitted
9. Arka Chatterjee; Studies on Light Harvesting Mechanism at Near Infrared Region of Solar Radiation for Potential Application in Photovoltaics and Photocatalysis; Under progress
10. Arpan Bera; Spectroscopic Studies on Functional Nanohybrids and their Potential Biological Application; Under progress
11. Dipanjan Mukherjee; Microfluidic-Assisted Optical Spectroscopic Studies on Biomolecular Recognition in Physiologically Relevant Engineered Environments; Under progress; Professor R. Das, West Bengal State University (Co-supervisor)
12. Md. Nur Hasan; Optical spectroscopy and Ab-initio study on biocompatible nanohybrids for their potential biomedical and environmental applications; Under progress; Dr. Debjani Karmakar, HBNI, BARC (Co-supervisor)
13. Susmita Mondal; Studies on Biochemical and Molecular aspects of Redox Modulatory Theranostic Nanomaterials in Preclinical Disease Model; Under progress
14. Arnab Samanta; Synthesis and Characterization of Nanoscale Alloys and Metal Oxides for Potential Application in Catalysis; Under progress; Dr. Subhra Jana, SNBNCBS (Co-supervisor)
15. Amrita Banerjee; Multi-parameter detection using optical spectroscopy for monitoring and control of bio-medical anomalies, food adulteration and

environmental pollution; Under progress; Dr. Subhadipta Mukhopadhyay, Jadavpur University (Co-supervisor)

16. Loapamudra Roy; Exploration of Optical Methodologies for the Development of Prototypes in the Real-world Application; Under progress; Professor Kallol Bhattacharya, Calcutta University, Kolkata (Co-supervisor)

17. Ria Ghosh; In-vitro and In-vivo investigation on self-organised assemblies for their potential drug delivery activities; Under progress; Professor Maitree Bhattacharyya, Calcutta university (Co-supervisor)

18. Nivedita Pan; Photophysical Studies on Hybrid Nanomaterials for manifold application; Under progress

b) External Project Students / Summer Training

1. Nairit Das; Development of Device for Food Safety; IIT KGP
2. Deepsikha; Development of Biomedical Instrument; Jamia Milia University
3. Neha Bhattacharya; Spectroscopic Studies on Biomaterials and Development of Small Spectroscopy-based Devices for Potential Application in Biomedical Diagnosis and Therapeutic Strategy; C.U
4. Mahasweta Goswami; Development of Biomedical Instrument for real world application; VIT

Teaching

1. Spring semester; PHY191; Integrated PhD; 13 students; with 1 (Dr. Soumen Mondal) co-teacher

Publications

a) In journals

1. Pritam Biswas, Aniruddha Adhikari, Susmita Mondal, Monojit Das, Siddhartha Sankar Bhattacharya, Debasish Pal, Sudeshna Shyam Choudhury and **Samir Kumar Pal**, *Synthesis and spectroscopic characterization of a zinc oxide-polyphenol nanohybrid from natural resources for enhanced antioxidant activity with less cytotoxicity*, Materials Today: Proceedings, 43, 3481-3486, 2021
2. Susmita Mondal, Aniruddha Adhikari, Manali Singh, Ria Ghosh, Mahasweta Goswami, Pritam Biswas and **Samir Kumar Pal**, *Spectroscopic study on the interaction of Co^{2+} with citrate-Mn_3O_4: Towards the development of nanotherapy against cobalt toxicity*, Materials Today: Proceedings, 43, 3692-3697, 2021
3. Aniruddha Adhikari, Susmita Mondal, Monojit Das, Pritam Biswas, Uttam Pal, Soumendra Darbar, Siddhartha Sankar Bhattacharya, Debasish Pal, Tanusri Saha Dasgupta, Anjan Kumar Das, Asim Kumar Mallick and **Samir Kumar Pal**, *Incorporation of a Biocompatible Nanozyme in Cellular Antioxidant Enzyme Cascade Reverses Huntington's Like Disorder in Preclinical Model*, Advanced Healthcare Materials, 10, 2001736, 2021
4. Md. Nur Hasan, Tuhin Kumar Maji, Uttam Pal, Arpan Bera, Damayanti Bagchi, Animesh Halder, Saleh A. Ahmed, Jabir H. Al-Fahemi, Tahani M. Bawazeer, Tanusri Saha-Dasgupta and **Samir Kumar Pal**, *Wide bandgap semiconductor-based novel nanohybrid for potential antibacterial activity: ultrafast spectroscopy and computational studies*, RSC Advances, 10, 38890 - 38899, 2020
5. Soumendra Singh, Animesh Halder, Oindrila Sinha, Nilasha Chakrabarty, Tanima Chatterjee, Aniruddha Adhikari, Priya Singh, Deep Shikha, Ria Ghosh, Amrita Banerjee, Partha Pratim Das Mahapatra, Amit Mandhar, Maitree Bhattacharyya, Surajit Bose, Saleh A. Ahmed, Ahmed Alharbi, Ahmed M. Hameed and **Samir Kumar Pal**, *Spectroscopic Studies on the Biomolecular Recognition of Toluidine Blue: Key Information Towards Development of a Non-Contact, Non-Invasive Device for Oral Cancer Detection*, Frontiers in Oncology, 10, 529132, 2020
6. Saleh A. Ahmed, Md. Nur Hasan, Damayanti Bagchi, Hatem M. Altass, Moataz Morad, Ismail I. Althagafi, Ahmed M. Hameed, Ali Sayqal, Abd El Rahman S. Khder, Basim H. Asghar, Hanadi A. Katouah and **Samir Kumar Pal**, *Nano-MOFs as targeted drug delivery agents to combat antibiotic-*

resistant bacterial infections, Royal Society Open Science, 7, 200959, 2020

7. Swati Rani, Damayanti Bagchi, Uttam Pal, Mamta Kumari, Manisha Sharma, Arpan Bera, Javaid Shabir, **Samir Kumar Pal**, Tanusri Saha-Dasgupta, and Subho Mozumdar, *The Role of Imidazolium-Based Surface-Active Ionic Liquid to Restrain the Excited-State Intramolecular H-Atom Transfer Dynamics of Medicinal Pigment Curcumin: A Theoretical and Experimental Approach*, ACS Omega, 5, 25582 – 25592, 2020

8. ipanjan Mukherjee, Tatini Rakshit, Priya Singh, Suman Mondal, Debashish Paul, Manisha Ahir, Arghya Adhikari, Theja P. Puthiyapurayil, Praveen Kumar Vemula, Dulal Senapati, Ranjan Das and **Samir Kumar Pal**, *Differential flexibility leading to crucial microelastic properties of asymmetric lipid vesicles for cellular transfection: A combined spectroscopic and atomic force microscopy studies*, Colloids and Surfaces B: Biointerfaces, 196, 111363, 2020

9. Essam M. Hussein, Nizar El Guesmi, Ziad Moussa, Uttam Pal, **Samir K. Pal,** Tanusri Saha Dasgupta, and Saleh A. Ahmed, *Unprecedented Regio- and Stereoselective Synthesis of Pyrene-Grafted Dispiro[indoline-3,2 -pyrrolidine-3 ,3 -indolines]: Expedient Experimental and Theoretical Insights into Polar [3 + 2] Cycloaddition*, ACS Omega, 5, 24081-24094, 2020

10. Tuhin Kumar Maji, Aswin J. R, Subhrajit Mukherjee, Rajath Alexander, Anirban Mondal, Sarthak Das, Rajendra Kumar Sharma, Naba Kumar Chakraborty, Kinshuk Dasgupta, Anjanashree M. R. Sharma, Ranjit Hawaldar, Manjiri Pandey, Akshay Naik, Kausik Majumdar, **Samir Kumar Pal**, K. V. Adarsh, Samit Kumar Ray, and Debjani Karmakar, *Combinatorial Large-Area MoS_2/Anatase–TiO_2 Interface: A Pathway to Emergent Optical and Optoelectronic Functionalities*, ACS Applied Materials & Interfaces, 12, 44345 – 44359, 2020

11. Nairit Das, Neha Bhattacharyya, Soumendra Singh, Animesh Halder, Deep Shikha and **Samir Kumar Pal**, *Simultaneous measurement of atmospheric moisture and temperature in the presence of suspended particulates using ultrasonic technique*, Japanese Journal of Applied Physics, 59, 096503, 2020

12. Tuhin Kumar Maji, Kumar Vaibhav, **Samir Kumar Pal** & Debjani Karmakar, *Broken symmetries and the related interface-induced effects at Weyl-system TaAs in proximity of noble metals*, Scientific Reports, 10, 14438, 2020

13. Soumendra Singh, Animesh Halder, SK. Abdul Mohid, Damayanti Bagchi, Oindrila Sinha, Amrita Banerjee, Probir Kumar Sarkar, Anirban Bhunia, Sanjay K. Ghosh, Amitabha Mitra and **Samir Kumar Pal**, *Nonthermal Atmospheric Plasma-Induced Cellular Envelope Damage of Staphylococcus aureus and Candida albicans Biofilms: Spectroscopic and Biochemical Investigations*, IEEE Transactions on Plasma Science, 48, 2768-2776, 2020

14. Debashish Paul, Anuradha Roy, Arpita Nandy, Brateen Datta, Prateeka Borar, **Samir Kumar Pal**, Dulal Senapati, and Tatini Rakshit, *Identification of Biomarker Hyaluronan on Colon Cancer Extracellular Vesicles Using Correlative AFM and Spectroscopy*, The Journal of Physical Chemistry Letters, 11, 5569-5576, 2020

15. Tuhin Kumar Maji, Kumar Vaibhav, Ranjit Hawaldar, K. V. Adarsh, **Samir Kumar Pal** and Debjani Karmakar, *Intriguing electronic and optical prospects of FCC bimetallic two-dimensional heterostructures: epsilon near-zero behavior in UV-Vis range*, Physical Chemistry Chemical Physics, 22, 16314-16324, 2020

16. Animesh Halder, Aniruddha Adhikari, Ria Ghosh, Soumendra Singh, Amrita Banerjee, Nilanjana Ghosh, Arnab Madhab Bhattacharya, Shrabani Mandal, Prantar Chakrabarti, Debasis Bhattacharyya, Hatem M. Altass, Moataz Morad, Saleh A. Ahmed, Asim Kumar Mallick and **Samir Kumar Pal**, *Large scale validation of a new non-invasive and non-contact bilirubinometer in neonates with risk factors*, Scientific Reports, 10 11149, 2020

17. Saleh A. Ahmed, Md. Nur Hasan, Damayanti Bagchi, Hatem M. Altass, Moataz Morad, Rabab S. Jassas, Ahmed M. Hameed, Jayita Patwari, Hussain Alessa, Ahmed Alharbi, and **Samir Kumar Pal**,

Combating Essential Metal Toxicity: Key Information from Optical Spectroscopy, ACS Omega, 5, 15666–15672, 2020

18. Kanika Kole, Animesh Halder, Soumendra Singh, Arnab Samanta, Sankar Das, Asim Kumar Kundu, Debasis Bhattacharyya, **Samir Kumar Pal**, and Subhra Jana, *Chromogenic-Functionalized Silica Nanoflower Composites for the Detection of Carbon Dioxide*, ACS Applied Nano Materials, 3, 4321-4328, 2020

19. Tuhin Kumar Maji, Md. Nur Hasan, Sangeeta Ghosh, Dirk Wulferding, Chinmoy Bhattacharya, Peter Lemmens, Debjani Karmakar and **Samir Kumar Pal**, *Development of a magnetic nanohybrid for multifunctional application: From immobile photocatalysis to efficient photoelectrochemical water splitting: A combined experimental and computational study*, Journal of Photochemistry and Photobiology A: Chemistry, 397, 112575, 2020

20. Ravinder Kumar, Debiprasad Panda, Debabrata Das, Arka Chatterjee, Binita Tongbram, Jhuma Saha, Sourabh Upadhyay, Raman Kumar, **Samir Kumar Pal** and Subhananda Chakrabarti, *Realization of high-quality InGaAs/GaAs quantum dot growth on Ge substrate and improvement of optical property through ex-situ ion implantation*, Journal of Luminescence, 223, 117208, 2020

21. Sudip Nag, Damayanti Bagchi, Dhrubajyoti Chattopadhyay, Maitree Bhattacharyya, **Samir Kumar Pal**, *Protein assembled nano-vehicle entrapping photosensitizer molecules for efficient lung carcinoma therapy*, International Journal of Pharmaceutics, 580, 119192, 2020

22. Mahitosh Biswas, Ravinder Kumar, Arka Chatterjee, Yuanpeng Wu Zetain Mi, Pallab Bhattacharya, **Samir Kumar Pal** and Subhananda Chakrabarti, *Effects of rapid thermal annealing in InGaN/GaN quantum disk-in-GaN nanowire arrays*, Journal of Luminescence, 222, 117123, 2020

23. Pritam Biswas, Aniruddha Adhikari, Uttam Pal, Priya Singh, Monojit Das, Tanusri Saha-Dasgupta, Sudeshna Shyam Choudhury, Ranjan Das and **Samir Kumar Pal**, *Flexibility modulates the catalytic activity of a thermostable enzyme: key information from optical spectroscopy and molecular dynamics simulation*, Soft Matter, 16, 3050-3062, 2020

24. Tuhin Kumar Maji, Damayanti Bagchi, Nivedita Pan, Ali Sayqal, Moataz Morad, Saleh A. Ahmed, Debjani Karmakar and **Samir Kumar Pal**, *A combined spectroscopic and ab initio study of the transmetalation of a polyphenol as a potential purification strategy for food additives*, RSC Advances, 10, 5636-5647, 2020

25. Aniruddha Adhikari, Pritam Biswas, Susmita Mondal, Monojit Das, Dr. Soumendra Darbar, Dr. Ahmed M. Hameed, Dr. Ahmed Alharbi, Prof. Saleh A. Ahmed, Dr. Siddhartha Sankar Bhattacharya, Dr. Debasish Pal, **Prof. Samir Kumar Pal**, *A Smart Nanotherapeutic Agent for in vitro and in vivo Reversal of Heavy-Metal-Induced Causality: Key Information from Optical Spectroscopy*, ChemMedChem, 15, 420-429, 2020

Talks / Seminars Delivered in reputed conference / institutions

1. Application-driven Basic Research for the Development of Indigenous Scientific Devices and Nanomedicines for Our Country: National Technology Day-2020; May 11, 2020; Kolkata; 60 Min
2. All Nanomedicines are Nanoparticles but all Nanoparticles are not Nanomedicines: Online FDP on "Advaced Materials & Engineering"; Jan 22, 2021; Kolkata; 60 Min
3. Proposal on Nanotechnology based Healthcare Solutions: Workshop on Grant Writing (Dec 08, 2020); Dec 8, 2020; IISc Bangalore; 60 Min

Administrative duties

1. Chairman, Pest Control
2. Convener, Project and Patent cell
3. Member, Internal Purchase Committee
4. Chairman, Technical Cell

Patents Taken and Process Developed with Details

1. A Compound Used in a Device for the Detection of Arsenic level in Drinking Water and its Method for Preparation thereof; PCT (International Patent) Appl. (2020); Applied
2. An Active Respirator with Attached Exhalation Valve and Suspended Particulate Matter Filter for Comfortable and Hygienic Breathing; Indian Pat. Appl. (2020), TEMP/E-1/29497/2020-KOL dated 23rd June 2020; Applied
3. A Long-lasting Nano-Sanitizer with a Dispensing Antimicrobial Layer; Indian Pat. Appl. (2020), TEMP/E-1/29493/2020-KOL dated 23rd June 2020; Applied
4. Development of Tribo-electroceutical Fabric for Potential Application inSelfSanitizing Personal Protective Equipment (PPE); Indian Pat. Appl. (2020), TEMP/E-1/42583/2020-KOL dated 4th September 2020; Applied
5. A Nanoceutical Fabric for Source-control to Prevent COVID-19 Spread Including Through Expelled Respiratory Droplets; Indian Pat. Appl. (2020), TEMP/E-1/42574/2020-KOL dated 4th September 2020; Applied

Awards, Recognitions

1. Fellow of National Academy of Engineering (FNAE) 2020
2. NASI-Reliance Industries Platinum Jubilee Award 2020
3. Abdul Kalam Technology Innovation National Fellowship 2020

Membership of Learned Societies

1. American Chemical Society
2. Indian Association for the Cultivation of Science, Life Member
3. Indian Physical Society
4. Indian National Academy of Engineering: INAE

Extramural Projects (DST, CSIR, DAE, UNDP, etc.)

1. Development of Nano Sensor and its Application through Cloud Based Network for Real Time Irrigation to Soil and Plant; Indian Council of Agricultural Science Fund (ICAR); 3 years; Co-PI
2. Development of an industrial process for the large-scale production of retro reflected material for potential application in display labels; Holoflex Limited; 1 year; PI
3. Emergent Phenomena in 2D Heterostructures; DST India; 5 years; Co-PI

Scientific collaborations with other national / international institutions (based on joint publications)

1. Professor Peter Lemmens Institute for Condensed Matter Physics Institut für Physik der Kondensierten Materie TU Braunschweig, Germany; Sl. No. 19; International
2. Professor Saleh Ahmed Umm Al-Qura University · Department of Chemistry, Saudi Arabia; Sl. No. 4, 5, 6, 9, 16, 17, 23, 25; International
3. Professor Asim Kumar Mallick NRS Medical College; Sl. No. 3, 16; National
4. Professor Ranjan Das, Department of Chemistry, West Bengal State University; Sl. No. 8; National
5. Professor Sudeshna Shyam Choudhury (bhattacharya) Department: Microbiology & Envs St.Xavier's College, 30 Park Street, Kolkata 700 016; Sl. No. 1, 23; National

Outreach program organized / participated

1. Speaker for lecture at "An International Webinar on Physics organized by Dept. of Physics, Pabna University of Science and Technology on 19thy May 2021
2. Speaker for the lecture at "Indian Physics Association Colloquium, Innovative Technology & Applications" on 8th May 2021

3. Speaker for the lecture at AWARENESS SESSION ON TECHNOLOGY COMMERCIALIZATION on 6th February 2021

Areas of Research

Ultrafast Spectroscopy

Femtosecond and Picosecond time resolved Laser spectroscopy, Biomolecules, Bio-Nano Interface and Selforganized molecular assembly, Light Harvesting, Dye Sensitized solar cells, Instrumentation.

Plan of Future Work Including Project

1. Development of biomedical instruments
2. Development of point of care diagnosis
3. Basic studies on energy harvesting materials
4. Development of nanomedicines and nanohybrids for treating different diseases
5. Basic experimental photophysical studies on bio-mimetic systems
6. Development of nanomedicines and nanohybrids for treating different diseases