Dr. Souvik Biswas

Assistant Professor · Department of Biomedical Engineering

National Institute of Technology Raipur, India

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Work Experience

National Institute of Technology Raipur   *Chhattisgarh, India*
Assistant Professor (Gr. II)   *July 2025 - till now*
- Department of Biomedical Engineering

Chalmers University of Technology   *Gothenburg, Sweden*
Postdoctoral Researcher   *Jan 2025 - till date*
- Department of Chemistry and Chemical Engineering

AI4ICPS I Hub Foundation and School of Med. Sc. & Tech., IIT Kharagpur   *Kharagpur, India*
Postdoctoral Fellow   *Mar 2024 - Dec 2024*
- Advisor: Prof. Soumen Das, School of Medical Science and Technology

Education

Indian Institute of Technology Kharagpur   *Kharagpur, India*
PhD in Biomedical Engineering   *Jul 2017 - Dec 2023*
- Thesis Submitted - 31st Dec 2023, Degree Awarded - 9th July 2024
- Joint Advisors: Prof. Soumen Das and Prof. Koel Chaudhury, School of Medical Science and Technology

Jadavpur University   *Kolkata, India*
Master of Engineering in Biomedical Engineering   *2015 - 2017*
- Grade: First Class, Marks: 8.66/10 (80.94%)

Maulana Abul Kalam Azad Univ. of Tech. (Formerly West Bengal Univ. of Tech.)   *Kolkata, India*
Bachelor of Technology in Biomedical Engineering   *2011 - 2015*
- Grade: First Class, Marks: 8.53/10 (77.80%)

Publications

Journals

A. Pal, **S. Biswas**, K. Chaudhury, and S. Das, "A Frugal Machine-intelligent Paper Sensor for Quantification of Glucose through Standalone Desktop Application: A Computational and Experimental Approach", ***Chemical Engineering Journal***, 2024.

A. Pal, **S. Biswas**, K. Chaudhury, and S. Das, "Paper Sensor Modified with MoS_2 for Detection of Dopamine Using a Machine-Intelligent Web App Interface", ***ACS Applied Materials & Interfaces***, 2023.

B. Pratihar, A. Jana, **S. Biswas** and S. De, "Pd nanoparticles-decorated borophene nanosheets for intrinsic polarization-induced visible light photocatalysis", ***Catalysis Science & Technology***, 2023.

S. Biswas, A. Pal, P. Chakraborty, K. Chaudhury, and S. Das, "Machine learning based urinary pH sensing using polyaniline deposited paper device and integration of smart web app interface: Theory to application", ***Biosensors and Bioelectronics***, 2022.

S. Ghosh, **S. Biswas**, S. Mukherjee, A. Pal, A. Saxena, S. Sundar, J. C. Dujardin, S. Das, S. Roy, R. Mukhopadhyay and B. Mukherjee, "A Novel Bioimpedance-Based Detection of Miltefosine Susceptibility Among Clinical Leishmania donovani Isolates of the Indian Subcontinent Exhibiting Resistance to Multiple Drugs", ***Frontiers in Cellular and Infection Microbiology***, 2021.

P. Choudhury*, **S. Biswas***, G. Singh, A. Pal, N. Ghosh, A. Kumar Ojha, S. Das, G. Dutta, K. Chaudhury, "Immunological profiling and development of a sensing device for detection of IL-13 in COPD and asthma", ***Bioelectrochemistry***, 2021.

*Equal Contribution

A. Pal, **S. Biswas**, S. P. O. Kare, P. Biswas, S. K. Jana, S. Das, K. Chaudhury, "Development of an impedimetric immunosensor for machine learning-based detection of endometriosis: A proof of concept", ***Sensors and Actuators B: Chemical***, 2021.

G. Kulkarni, P. G. Ray, S. Das, **S. Biswas**, S. Dhara, S. Das, "Raman spectroscopy assisted biochemical evaluation of L929 fibroblast cells on differentially crosslinked gelatin hydrogels", ***Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy***, 2021.

S. Biswas, A. Pal, K. Chaudhury, S. Das, "Polyaniline Functionalized Impedimetric Paper Sensor for Urine pH Measurement", ***IEEE Sensors Journal***, 2020.

A. De, **S. Biswas**, A. Konar, L. Ghosh, "A Functional Near Infrared Spectroscopy Based Evaluation of Cognitive Lagging from Prefrontal Hemodynamics", ***IEEE Sensors Letters***, 2020.

Peer-Reviewed Conferences

A. Basu, **S. Biswas**, and S. Das "Utilizing Electropolymerized Polyaniline Films for Acetic Acid Detection: A Proof of Concept", ***IEEE Sensors***, Kobe, Japan, Oct, 2024.

S. Biswas, A. Pal, K. Chaudhury and S. Das "Quantitative Estimation of Ascorbic Acid using Graphene Oxide : Experimental Validation of First-principle Analysis", ***IEEE Biosensors***, London, UK, Aug, 2023.

A. Pal, **S. Biswas**, K. Chaudhury and S. Das "MoS_2 Functionalized Paper Sensor for Quantification of Glucose : Experimental Observation and Ab-Initio Calculations", ***IEEE Biosensors***, London, UK, Aug, 2023.

S. Biswas, A. Pal, S. Das and K. Chaudhury "Selective Detection of Dopamine using 2D-hBN : A First Principle Analysis", ***IEEE International Conference on Recent Advances in Electrical, Electronics & Digital Healthcare Technologies (REEDCON)***, 2023, New Delhi, May, 2023. **(Best Paper)**

S. P. O. Kare, **S. Biswas**, A. Pal, K. Chaudhury, S. Das, "Disposable Hand Drawn Electrode Paper based Urea Sensor by Impedance Spectroscopy", ***IEEE Sensors***, 2019.

A. De, A. Konar, A. Samanta, **S. Biswas**, A. L. Ralescu, A. K. Nagar, "Cognitive load classification in learning tasks from hemodynamic responses using type-2 fuzzy sets", ***IEEE International Conference on Fuzzy Systems (FUZZ)***, Naples, Italy, 2017. **(Best Paper)**

Patents

G. Singh; **S. Biswas**, A. Pal, N Ghosh, P. Bhattacharyya, K. Chaudhury, "A diagnostic device and method for differentiating asthma-COPD overlap syndrome (ACO) from asthma and COPD" (***Indian Patent***, **Granted**, Publication Number: 435183, Application Number: 202011035750)

S. Biswas, A. Pal, K. Chaudhury, S. Das, "Deep Neural Network-Enabled Smart Urea Sensing Through Paper-Based Impedimetric Sensors" (***Indian Patent***, **Filed**, Application Number: 202431052579)

Abstracts

S. Biswas, A. Pal, K. Chaudhury, S. Das, "Development of machine learning-driven web app interface for quantitative estimation of urine pH: Theory to experimental validation", ***ACS Spring Meetings***, Indianapolis, USA, 2023.

A. Pal, **S. Biswas**, K. Chaudhury, S. Das, "MoS2 modified paper sensor towards selective detection of uric acid: Experimental validation of first principle calculations", ***ACS Spring Meetings***, Indianapolis, USA, 2023.

Thrust Areas

⚙ Electronic Materials   🖥 DFT Simulations   ⚗ Electrochemical Sensors   🪄 AI/ML for Healthcare   ☁ IoT based Devices

Research Experience

Department of Chemistry and Chem. Engg., Chalmers University of Technology   *Gothenburg, Sweden*
Division of Chemistry and Biochemistry   *2025 - till date*
- Project : Spectroscopic characterization of nanocellulose for optoelectronics

School of Medical Science and Technology, IIT Kharagpur *West Bengal, India*
BIOSENSORS AND MICROFLUIDICS LABORATORY *2019 - 2024*
- Collaborative Project : MoS_2 based Biosensing Platform

School of Medical Science and Technology, IIT Kharagpur *West Bengal, India*
CLINICAL BIOMARKERS RESEARCH LABORATORY *2017 - 2019*
- Collaborative Project: Development of Smart Endometriosis Sensor

Department of Electronics and Telecommunication Engineering, Jadavpur Unviersity *West Bengal, India*
ADVISOR: PROF. AMIT KONAR *2015-2017*
- Master's Thesis: "A Neuroimaging Approach on The Cognitive Assessment of Memory Performance"

CSIR-Central Glass and Ceramic Research Institute *West Bengal, India*
DIVISION OF BIOCERAMICS & COATING *2015*
- Awarded Summer Research Internship, Project: Smart Fluid Dispensing System and Temperature Controller for Instron 8511.20 Hip Joint Simulator

Skills

Material Characterization Techniques Used : SEM, EDX, TEM, XPS, UPS, XRD, FTIR, AFM, Raman Spectroscopy, Hall Measurement (Conductivity).

Instruments Handeled : Raman spectroscopy (Witec), Zetasizer (Malvern), Impedance analyzer (Agilent), TGA (Mettler Toledo), UTM (Instron), THz System (Toptica), Dielectric Relaxation Spectroscopy (Novocontrol), Electrochemical workstation (VersaSTAT, Palmsens), Thin-film deposition system (HINDHIVAC), Chemical Vapour Deposition Unit (Indigenous), Oxygen plasma (Diener), Four probe measurement (Ecopia), Solid dielectric fixture (Agilent), Bright field microscope (Leica).

Electronic Structure Codes: Quantum ESPRESSO, Wannier90, SIESTA, QuantumATK.

Scientific and Programming Tools: MATLAB, Python, MULTISIM, PSPICE.

Awards, Fellowships, & Grants

2024   **Chanakya Postdoctoral Fellowship**, IIT Kharagpur AI4ICPS I Hub Foundation

2023   **International Travel Support**, Science and Engineering Research Board, Govt. of India
Institute Travel Grant for Best Conferences, Indian Institute of Technology Kharagpur
Best Paper Award, IEEE REEDCON, Delhi, India

2017   **Best Paper Award**, International Conference on Fuzzy Systems (FUZZ-IEEE), Naples, Italy

2015   **Summer Research Fellowship**, CSIR-Central Glass and Ceramic Research Institute, Kolkata

2011-2015   **Swami Vivekananda MCM UG Scholarship**, Directorate of Tech. Edu., Govt. of West Bengal

Teaching Experience

2019-2023   **Fundamentals of Medical Instrumentation (MM71315)**, Teaching Assistant, SMST *IIT Kharagpur*
2019-2022   **Medical Electronics Lab (MM69320)**, Teaching Assistant, SMST *IIT Kharagpur*
2018-2019   **Electronics Lab (PH49007)**, Teaching Assistant, Department of Physics *IIT Kharagpur*
2019-2023   **Raman Spectroscopy Operator**, School of Nanoscience and Technology *IIT Kharagpur*

Outreach & Professional Development

SERVICE AND OUTREACH

2018   **Chair, IEEE EMBS Student Branch Chapter**, IEEE Kharagpur Section
2019   **Vice Chair, IEEE EMBS Student Branch Chapter**, IEEE Kharagpur Section

Peer Review Activities

Chemical Engineering Journal - Elsevier	IEEE Sensors Journal
Sensors and Actuators B: Chemical - Elsevier	IEEE Transactions on Instrumentation and Measurement
Michrochimica Acta - Springer	IEEE Transactions on Industrial Electronics
Journal of Neuroscience Methods - Elsevier	Microelectronics Journal - Elsevier
Accident Analysis and Prevention - Elsevier	ACS Omega

Professional Memberships

Graduate Student Member, ACS, Since 2023
Student Member, IEEE, Since 2017

Referees

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