

Dr. Appan Roychoudhury

Ramalingaswami Re-entry Fellow

Postdoctoral Research, University of Edinburgh, United Kingdom

PhD, Indian Institute of Technology Delhi, India



About

My research focuses on molecular diagnostics and point-of-care test (POCT) development for clinical applications. I am particularly passionate about conducting research on biosensors, microfluidics, lab-on-a-chip and nanobiotechnology, aiming to develop affordable, scalable and easy-to-handle *in vitro* diagnostic (IVD) tests for human and veterinary healthcare. I completed my bachelor's degree (BTech) in Biotechnology from the West Bengal University of Technology, and my master's degree (MTech) in Bioelectronics from the Tezpur University (Central University, Assam). Following my master's, I joined Delhi Technological University to work on an Indian Council of Medical Research (ICMR) funded project, developing glucose biosensors for clinical diagnostics. My interest in biosensor research led me in the doctoral studies at the Indian Institute of Technology Delhi. During my PhD program, I developed electrochemical biosensors and capillary electrophoresis microchip devices for the multiplexed detection of neurotransmitters, as well as for food fermentation quality monitoring at the point of use. Following my PhD, I started postdoctoral research at the University of Edinburgh, developing point-of-care diagnostic tests for drug-induced liver injury (DILI) by detecting an early and specific biomarker, microRNA-122 (miR-122), from blood samples. The diagnostic test I developed during my postdoctoral studies secured the ICURe Explore grant from the UKRI Innovate UK for market validation testing (webpage: <https://pointliverdx.com/>; and animated video explaining diagnostic service: <https://youtu.be/juE16Khs9UU>). I was awarded Ramalingaswami Re-entry Fellowship (2023-24 cycle) from the Dept. of Biotechnology (DBT), Govt. of India. I joined Gujarat Biotechnology University as a Ramalingaswami fellow, and my current research is focussed on multiplexed detection of blood circulating biomarkers at point of care for clinical diagnostics.

Background

Professional Experience

Postdoctoral Research Associate (2019 - 2024), Infection Medicine and Centre for Inflammation Research, University of Edinburgh, United Kingdom

Project Associate (2012 – 2013), Department of Biotechnology, Delhi Technological University, India

Education

PhD in Biomedical Engineering (2014 – 2019), Indian Institute of Technology Delhi, New Delhi, India

MTech in Bioelectronics (2010 - 2012), Tezpur University, Assam, India

BTech in Biotechnology (2005 - 2009), West Bengal University of Technology, Kolkata, India

Honours and Awards

- Ramalingaswami Re-entry Fellowship (2024) - Dept. of Biotechnology (DBT), Govt. of India
- Distinction in Doctoral Research (2019) - IIT Delhi
- International Travel Grant (2018) – Indian Council of Medical Research (ICMR), Govt. of India
- Visiting Research Fellow at Bio-Nano Electronics Research Centre, Toyo University, Japan (2015) – Toyo University and IIT Delhi
- International Travel Support (2015) - Science and Engineering Research Board (SERB), Govt. of India
- Graduate Aptitude Test in Engineering (GATE) Biotechnology (2010) - Ministry of Human Resources Development (MHRD), Govt. of India

Research Overview

Presently, I am working on the rapid detection of circulating biomarkers from finger-prick blood to provide immediate results with clinical utility. Blood circulating biomarkers have been established as early, specific and sensitive indicators of clinical disorders. My focus is on developing sample-to-answer tests using electrochemical biosensors and lateral flow assay kits for early disease diagnosis at point of care.

A key aspect of my work focuses on multiplexed sensing of circulating biomarkers, as complex diseases such as liver injury and cancers demand simultaneous detection of multiple biomarkers for precise diagnosis. My assay aims to provide accurate and reliable sensing, enabling decentralized testing, for instance, in primary healthcare settings or even at home, facilitating early clinical decisions. This will allow early therapeutic intervention and personalised treatment strategies, ultimately improving patient outcomes and reducing the burden on healthcare systems.

Patent Granted

- Capillary electrophoresis microchip for beer and wine quality testing, Indian Patent No: 474573 dated November 29, 2023

Journal Publications

- **A Roychoudhury**, F Diez, RJ Mellanby, JW Dear, TT Bachmann, Circulating microRNA detection using electrochemical biosensor for rapid diagnosis of liver disease in dogs, *Sensors and Diagnostics* 3, 1190-1200, (2024). (IF: 3.5)
- **A Roychoudhury**, JW Dear, M Kersaudy-Kerhoas, TT Bachmann, Amplification-free electrochemical biosensor detection of circulating microRNA to identify drug-induced liver injury, *Biosensors and Bioelectronics* 115298, (2023). (IF: 10.7)
- **A Roychoudhury**, RJ Allen, T Curk, J Farrell, G McAllister, K Templeton, TT Bachmann, Amplification free detection of SARS-CoV-2 using multi-valent binding, *ACS Sensors* 7, 3692–3699, (2022). (IF: 8.2)
- **A Roychoudhury**, JW Dear, TT Bachmann, Proximity sensitive detection of microRNAs using electrochemical impedance spectroscopy biosensors, *Biosensors and Bioelectronics* 114404, (2022). (IF: 10.7)
- **A Roychoudhury**, KA Francis, J Patel, SK Jha, S Basu, A decoupler-free simple paper microchip capillary electrophoresis device for simultaneous detection of dopamine, epinephrine and serotonin, *RSC Advances* 10 (43), 25487-25495, (2020). (IF: 3.9)
- **A Roychoudhury**, S Basu, SK Jha, Dopamine biosensor based on surface functionalized nanostructured nickel oxide platform, *Biosensors and Bioelectronics* 84, 72-81, (2016). (IF: 10.7)