Development of nano-biosensor for the detection of waterborne pathogens in the interest of public health and education

https://uclanindiawatersolutions.net/

University of Central Lancashire, Preston, UK; Indian Association for the Cultivation of Science, Kolkata, India & Feedwater Ltd., UK

Funded by Funded by BRITISH COUNCIL

Project Description

The project focused on developing nanotechnology-based sensor for both microbial and toxic chemicals in ground water / wastewater. It integrated laboratory research, mobility (exchange visits), co-supervision of PhD students, joint module development with industrial importance, dissemination via workshops, conferences, journal publications, and outreach to the young generation during science festivals.

Major Achievements

- Joint research on novel multifunctional nanomaterials for the detection of (i0 mercury from water in Kolkata and (ii0 dectection fo waterborne microorganisms such as E-coli in UK.
- One international chemical policy workshops in the UK and one public engagement event in Kolkata, India involving British Council members, industrial researchers, Government policymakers, and the general public.
- Hosted skills development program by providing training on health & safety in the chemical laboratory, analytical techniques, and nanocomposite synthesis to exchange students and staff.
- UK project lead examined a PhD student from IACS and later arranged an exchange visit to UK in Nov'24
- Facilitated a summer internship program for undergraduates to develop nanomaterials and analytical skills, funded by the Royal Society of Chemistry, UK
- Staff/Student exchanges as a part of mobility program
- Presented our activity at Burlington Consensus 3, London as a part of capacity building, organized by the United Nations under OEWG-3, formed by the Royal Society of Chemistry, UK

Feedback on British Council's support

- The British Council's support was invaluable throughout the project. The staff in the British Council office in India was always available to assist with any queries, providing timely and effective help whenever needed.
- We are grateful for sending Mr Micheal Houlgate, Deputy Director, British Council India and Dr Andrew Fleming, British Deputy High Commissioner to Kolkata during our Bilateral workshop, 5th April 2024

Total Number of Faculty Exchanges

Total 8 (UK to India 4; India to UK 4)
UK project Lead Dr Tapas Sen [Dec'23, April'24,Oct'24]
UK Industry lead Mr Gary Hogben (April 2024)
Indian project Lead Prof Asim Bhaumi, (July 2024)
Project collaborator Dr Somenath Roy, CGCSRI (July 2024)
Project collaborator Prof Anita Verma, Delhi University (July 2024)
Indian SME lead Dr Divya Rathod (July 2024)

Total Number of Student Exchanges

Total 1 (India to UK 1)
Indian PhD student, Mr Anirban Ghosh (November 2024)

Total Number of Joint Research Outcomes

Total 3: High-impact Peer-Review journal articles (2 under review, 1 under preparation), 5 keynotes presentations at International policy workshops, 1 plenary talk at International conference in Armenia, 2 keynotes to International audience at Armenia and Japan

Total Number of Audience Reach

Worldwide more than 10000 via the project website: https://uclanindiawatersolutions.net/
More than 2000 via online and face-to-face delivery of 2 chemical policy workshops, 1 project workshop, and conference presentations

Total Number of TNE Initiatives

Total 7 (2 joint research seminars, 2 international workshops, 2 laboratory trainings, 1 joint module delivery via an online platform)

Project Video Links

1st Bilateral workshop in hybrid mode, Kolkata, India, 5th April 2024

2nd International policy workshop in Uclan, Preston, UK
https://www.youtube.com/watch?v=h8b0M5sI3Vc
https://www.youtube.com/watch?v=OGWSWr1v_rE
Panel discussion:
https://www.linkedin.com/feed/update/urn:li:activity:7209594257026727936/?originTrackingId=8dQyKnpwQVuN0hkG3Lb4aQ%3D%3D
Outreach event, June 24:
https://www.linkedin.com/feed/update/urn:li:activity:7209594257026727936/?originTrackingId=8dQyKnpwQVuN0hkG3Lb4aQ%3D%3D

Innovative Aspects

- Nanotechnology-based water purification technology
- Cost-efficient, simple, and one-step magnetic separation protocol for the removal of pollutants from water
- Online platform for students/staff engagement with minimum travel for environmental sustainability
- Dissemination of project goals via one international chemical policy workshops involving Government policy makers and the public health department by meeting the United Nations Sustainable Goals

Key Lessons Learnt

- International collaboration is essential for solving global health & environmental issues via joint research and knowledge exchange
- Cross-disciplinary approaches are important for tacking complex issues
- Training workshops and hands-on sessions enhance skills development for next-generation scientists
- Outreach to young students, teachers, and the general public is the key to public-funded projects
- Proper risk assessment is essential for meeting project goals and timeline

List of Significant Activities

- Development of novel multifunctional nanomaterials for detection of mercury and Ecoli from water
- 3 high-impact Peer-Review journal articles (2 under review, 1 under preparation)
- Outreach to the general public, young students, and teachers via Science Festivals
- 1 international chemical policy workshop in the UK involving academic and industrial researchers, British Council members, Government agencies, and the General public.
- Examined 1 PhD student and providing opportunity for an exchange visit to UK
- Skills development, knowledge exchange, and capacity building under the United Nations OEWG-3, established by the Royal Society of Chemistry.
- Successful in bidding 2 Royal Society of Chemistry Summer Internships, 1 prestigious Daphne Jackson Fellowship (funded by EPSRC+NERC) in the UK.

Testimonials from Participants

"As a visiting scholar, I had the opportunity to contribute to key experiments and laboratory work in this project. The experience allowed me to enhance both my professional development and academic network."
– Dr. Mohammed M Algaradah, Saudi Arabia

"As a PhD student at UCLan, this project not only enhanced my technical skills but also provided valuable insights into international collaboration."
– Marwa Elhariry, UK

"As an undergraduate student at UCLan, I had the opportunity to join this project as a summer intern, where I learned valuable analytical techniques, which greatly enhanced my research skills."
– Ashley Jane Maude, UK

Add Anirban's testimonial over here:

Project Pictures





































