香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

土木及環境工程學系
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

SEMINAR

TOWARD A CARBON-NEUTRAL FUTURE: INTEGRATING MULTIDISCIPLINARY RESEARCH FOR SUSTAINABLE IMPACT

Speaker
Prof. Ajit K Sarmah
University of Auckland (UoA), New Zealand

Abstract

Conventional infrastructure materials such as cement, steel, bitumen, and aggregates contribute significantly to global carbon emissions. To mitigate these impacts, alternative sustainable materials are needed—not only to reduce embodied carbon but also to enable long-term carbon sequestration. One such material is biochar—a highly porous, carbon-rich solid derived from the pyrolysis of organic waste under limited or no oxygen conditions. In this presentation, examples will be provided on partial substitution of cement and sand with biochar to enhance the mechanical performance and durability of concrete/mortar while reducing their carbon footprint. This presentation would particularly explore how tailored biochar additions and engineered biochar properties can be leveraged to create cementitious composites with optimized thermal conductivity, density, and porosity for diverse construction applications. Findings from our recent studies will be presented, including the use of biochar for contaminant remediation in soils and water; development and performance comparison of biochar cement concrete versus traditional concrete; mechanical behaviour of wood-plastic-biochar composites; role of biochar in enhancing soil shear strength, a critical factor for liquefaction mitigation in geotechnical engineering and biochar's use as landfill liner material. Finally, the presentation will offer a resilience-focused perspective on the production and deployment of biochar across sectors, highlighting its potential to serve as a carbon-negative material in the broader context of climate-resilient infrastructure.

Biography

Dr. Ajit K Sarmah is currently a Professor of Civil and Environmental Engineering at the University of Auckland (UoA), New Zealand. He is also an Adjunct Professor at the Institute of Agriculture, University of Western Australia, Perth, AUSTRALIA. Additionally, he is also an Honorary Professor at the Centre for Sustainable Water Research, Indian Institute of Technology, Guwahati, INDIA. He received his Bachelor Degree in Agricultural Engineering from India. He holds MEng (Soil and Water) from the Asian Institute of Technology, Bangkok, Thailand and MS in Soil Physics from the University of Queensland, AUSTRALIA. He obtained his PhD in 'Soil and Water' from the University of Adelaide, South Australia. Prior to coming to the UoA, he worked as Senior Research Scientist at Manaaki Whenua Landcare Research NZ Ltd, Hamilton, New Zealand; as Visiting Scientist in Civil & Environmental Engineering/Agronomy Department, Purdue University, USA; as Research Fellow at the University of Western Australia, and as Research Associate at the Asian Institute of Technology, Bangkok, Thailand.

Prof. Sarmah has gained significant national and international recognition for his applied research in BIOCHAR. His pioneering work on biochar's use in non-soil areas such as wood plastic composites, construction & building sectors, decarbonization technology, including CO_2 sequestration in concrete with biochar as filler gained significant international recognition. His other areas of research include environmental fate modelling of emerging contaminants such as steroid hormones (both single-free and conjugated forms), veterinary antibiotics and pharmaceutical compounds. Additionally ongoing work involves fate and transport tire-wear particles and other microplastics and life cycle analysis of biomass-derived biochar for application in diverse sectors to reduce carbon foot print.

Prof. Sarmah is 2021, 2022, 2023 Clarivate highly Cited Researcher and to date he has published >200 papers in ISI-Web of Science listed Journals, 10 book chapters, 1 Book and presented 30 plenary and keynote addresses in international conferences/symposiums. Dr. Sarmah's papers have been cited more than 25,000 (Google) times with and Google h-index = 77.

Prof. Sarmah is an Editorial Advisory Board member of Elsevier's "TrAc Trends in Analytical Chemistry" (IF 12.0), Critical Reviews in Environmental Science & Technology (IF 13.2); Associate Editor for Springer's "Environmental Management" (IF = 3.8), and Board Member of Springer's "BIOCHAR" Journal (IF 13.5). Earlier he served as Associate Editor for Elsevier's Science of the Total Environment (IF: 8.0), and Associate Editor for Elsevier's "Process Safety & Environmental Protection" (IF 7.8).

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Room 3574 (Lift 27/28)
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Conference Room

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