Speaker Biography: Professor Renwu Zhou

Renwu Zhou is currently a professor at Xi'an Jiaotong University, China. His main research background lies in the area of plasma physics and chemistry, and plasma-enabled applications for sustainable chemical production and green processing. He has published over 150 peer-reviewed articles (80 as first-author and/or corresponding author) and many of them are published on high-impacted journals (e.g., Science Advances(1), Journal of the American Chemical Society(3), Advanced Materials(1), Energy & Environmental Science(2), Applied Catalysis B: Environment and Energy(2) and Carbon Energy, with more than 9000 citations in Google Scholar. 12 of them are accessed as ESI highly cited papers. His research achievements have been recognized with the First Prize for Scientific and Technological Achievements from the Department of Education of Henan Province and the iSPEC Youth Plasma Innovator Award 2025. He serves on the Committee on the Origin and Evolution of Life in Space of the Chinese Society of Space Research and as a Young Committee Member of the Plasma Science and Technology Committee of the China Electrotechnical Society. He also serves as the Conference Chair of the 18th International Conference on Plasma Science and Applications, an associate editor of Modern Low Temperature Plasma, a Young Editorial Board Member of Exploration and Nano-Micro Letters, the guest editor of Frontiers of Chemical Science and Engineering, Plasma Processes and Polymers, and is selected in Top 2% of Scientists on Stanford List from 2022-2024.

Plasma-Assisted Nitrogen Fixation for Greener Agriculture

Sustainable nitrogen fixation is essential for reducing the energy consumption and environmental impact associated with conventional fertilizer production. Non-thermal plasma offers an attractive electrified approach for activating atmospheric nitrogen under ambient conditions and can be readily integrated with renewable electricity. In this seminar, we present an **Air-to-NO_x-to-NH_3/NH_4NO_3** pathway for producing liquid nitrogen fertilizer. Air is first converted into aqueous nitrogen oxides using a nanosecond-pulsed underwater multi-bubble plasma reactor. The resulting nitrate-containing solution is subsequently partially reduced by electrocatalysis to produce an NH_4NO_3-containing liquid fertilizer. Electrical diagnostics, optical emission spectroscopy, and plasma chemistry modelling are used to understand how pulse characteristics and discharge modes regulate nitrogen fixation. The study further explores the application of the plasma-derived liquid fertilizer for plant growth and evaluates the energy and economic feasibility of the process. Overall, this work demonstrates the potential of combining **air, water, and renewable electricity** for decentralized and sustainable fertilizer production, providing a promising route toward greener agricultural nitrogen management.