THE UNIVERSITY OF SYDNEY

School of Chemical and Biomolecular Engineering

SEMINAR INVITATION

Sustainable electrosynthesis of hydrogen and ammonia

Presented by

Dr. Alexandr Simonov

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Date: Tuesday 7th February 2023
Time: 2:00 pm – 3:00 pm (Sydney time)
Venue: Lecture Theatre 1 (J01, Room 201), Chemical Engineering Building
Also Via Zoom: 522 796 0108

Speaker Details: Alexandr N. Simonov is an Australian Research Council Future Fellow specialising in (photo)electrochemistry and (photo)electrocatalysis over the past 12 years. The major focus of his research is the design of new effective ways to generate and use renewable electricity for the sustainable chemistry technologies. His major research focuses on the development of catalysts, electrode architectures and electrolytic devices for generation of hydrogen through splitting of water (including seawater), reduction of nitrogen to ammonia, as well as selective oxidation of ammonia and nitrogen to nitrates for fertiliser generation. He collaborates with Australian and German industry on several projects aiming to develop new cost-effective water electrolysers. He is a co-founder of a spin-out company Jupiter Ionics Pty Ltd. working on the commercialisation of the Monash technologies for ammonia synthesis and oxidation.

Seminar Details: Hydrogen and ammonia are broadly recognised as significant future energy carriers, while remaining some of the most important commodity chemicals. Notwithstanding water electrolysis is a more than two-century-old technology, it is yet to become a major pathway towards industrial H_2 production, especially using renewable electricity and seawater in the most sustainable version of this process. The synthesis of NH_3 can be also entirely powered by renewables in an electrochemical process, although broad deployment of this technology is unlikely to be achieved immediately. The talk will introduce our vision of the evolution of the ammonia economy with a particular focus on the NH_3 generation pathways. In the context of the ammonia electrosynthesis using H_2 as a source of protons and electrons, our recent developments in the non-conventional water electrolysis strategies will be discussed, followed by the demonstration of the challenges of the hydrogen oxidation reaction under the N_2 reduction conditions. Further, the talk will focus on our latest progress in the electrochemical conversion of N_2 to NH_3 via a redox mediated mechanism. Finally, recent highlights on our efforts towards commercialisation of ammonia electrosynthesis through a spin-out company Jupiter Ionics Pty Ltd will be briefly highlighted.