DIPARTIMENTO DI SCIENZE
E INGEGNERIA DELLA MATERIA,
DELL'AMBIENTE ED URBANISTICA

Invited Seminar: Monday 23 September 2024, 14:30, Aula 160/3

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Innovative electrolytes for lithium and post-lithium batteries

Non-flammable ionic liquid electrolytes (ILEs) are well-known candidates for safer and long-lifespan lithium metal batteries (LMBs). However, the high viscosity and insufficient Li+ transport limit their practical application. Recently, non-solvating and low-viscosity co-solvents diluting ILEs without affecting the local Li+ solvation structure are employed to solve these problems. The diluted electrolytes, i.e., locally concentrated ionic liquid electrolytes (LCILEs), exhibiting lower viscosity, faster Li+ transport, and enhanced compatibility toward lithium metal anodes, are feasible options for the next-generation high-energy-density LMBs. In the presentation, the progress of the recently developed LCILEs are summarised, including their physicochemical properties, solution structures, and applications in LMBs with a variety of high-energy cathode materials. Lastly, a perspective on the future research directions of LCILEs will be given as well as the most recent results on Li and post-Li metal anode cells.

Biography

Stefano Passerini is Senior advisor at Austrian Institute of Technology since July 2024 and Distinguished Senior Fellow at Karlsruhe Institute of Technology (KIT) since January 2023. In 2023 he was Professor at the Chemistry Department of the Sapienza University of Rome after retiring from the Professor position at KIT and the co-Director position at Helmholtz Institute Ulm. His research focuses on the basic understanding and development of materials for high-energy batteries and supercapacitors, with the goal to create sustainable energy storage systems from environmentally friendly and available materials and processes. He is an internationally recognized pioneer in the field of ionic liquids and the development of sodium-ion batteries. Co-author of more than 700 scientific papers (Scopus H-Index: 122; > 50,000 citations), a few book chapters and several international patents, he has been awarded in 2012 the Research Award of the Electrochemical Society Battery Division. Since 2015 he is acting as Editor-in-Chief of Journal of Power Sources. He has been nominated Fellow of the International Society of Electrochemistry (2016) and the Electrochemical Society Inc (2020). Since 2019 he is a member of the Leopoldina German Academy of Science.

Organisers: Dr. Henry Adenusi, Prof. Francesco Vita & Prof. Oriano Francescangeli