学术报告

Mechanisms and Polarisation of Electrodes for Proton Ceramic Electrochemical Cells

报 告 人：Truls Norby

报告时间：2024年8月20日上午10:00

报告地点：化工学院A408会议室

报告人简介：

Truls Norby (b. 1955) has his PhD from University of Oslo (UiO) 1986, became professor at Department of Chemistry UiO 1994 and since 1997 heads Group for Electrochemistry. He works with defects and transport in materials for solid-state fuel cells, electrolysers, batteries, membranes, and sensors, specialising in protons and protonic transport in oxides and on their surfaces. He also integrates materials chemistry and semiconductor physics in photoelectrochemistry, oxide thermoelectrics, and innovations in design and fabrication. Norby has published more than 300 journal papers, graduated more than 100 Master- and PhD-students, and is member of the Norwegian Academy of Science and Letters and three other national academies. He has founded three companies and won the UiO Innovation Prize 2012 and the Norwegian Guldberg-Waage medal for chemistry 2018.

Proton ceramic electrochemical cells (PCECs) comprising fuel cells (PCFCs), electrolysers (PCEs), and reactors (PCERs) require well-conducting electrolytes of mechanical and thermochemical stability, but even more so electrodes with sufficient electrocatalytic activity at moderate temperatures. Oxide positrodes for PCFCs and PCEs are particularly challenging due to limited surface catalytic activity for the oxygen redox reaction and solubility of protons. Current research aims to improve these by, e.g., exsolution of catalytic nanoparticles and optimisation of hydration thermodynamics, in addition to microstructure. Interpretation of experimental polarisation results and degradation phenomena requires physicochemical understanding of the reaction mechanisms and microstructural paths and application of appropriate mathematical models, a field underdeveloped for solid oxide electrochemical cells (SOECs) in general and for PCECs in particular.

The polarization processes at solid-state electrodes comprise space charge layer depletion resistance, charge transfer between the electrolyte and electrode phases, and mass transfer in and on the electrode material.

In addition to the cathode, anode reaction is also important and will be discussed in this report.

主办方：中国矿业大学化工学院