

Title Protons and exotic hydrogen species in oxides
- presence, effects, and applications

Speaker Prof. Truls Norby
Professor
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Date & Time Friday, March 14, 2014 4:00 p.m.

Place I²CNER Hall, Ito campus, Kyushu University

Abstract

Protons dissolve as positive defects in oxides in equilibrium with surrounding water vapour. This affects the properties of the oxide and makes many of them proton conducting solid electrolytes for fuel cells or steam electrolyzers, or mixed proton electron conducting hydrogen permeable membranes. The thermodynamics and kinetics involved are quite well understood, along with properties in grain boundaries and surfaces. Hydrogen defects play also a role in many semiconductors and solar materials. Some unexplained phenomena are discussed in terms of exotic hydrogen species.

About the Speaker

Prof. Truls Norby (b. 1955) has his PhD from the University of Oslo (UiO) 1986, where he studied and worked with late prof. Per Kofstad. Norby became professor at the Department of Chemistry 1994 and head of the Group for Solid-State Electrochemistry (FASE) in 1997. Since 2007 he heads the top-tier centre FERMiO (Functional Energy Related Oxides in Oslo) which is part of the Centre for Materials Science and Nanotechnology (SMN) at UiO. Norby works with thermodynamics and transport of defects in materials for solid-state fuel cells, electrolyzers, gas separation membranes, sensors and protection layers. He specialises in protons in oxides and their use in high temperature proton conductors and hydrogen separation membranes. Recently he has published significant papers on the effect of lattice defects on the photocatalytic properties of oxides and all-solid-state photoelectrochemical production of hydrogen. He has published more than 190 journal papers, supervises 12 Master and PhD-students, and has founded companies NorECs AS which develops, manufactures, and sells equipment and Protia AS which develops energy conversion processes using proton conducting materials.

Host: Professor Hiroshige Matsumoto

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