

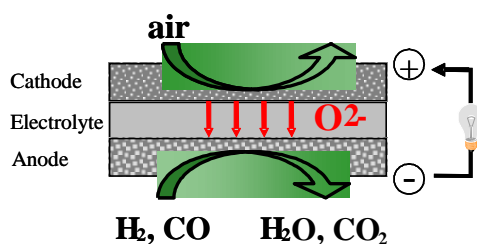
Subject proposal for Erasmus students in Chemistry

New oxide ion and electronic conductors for Solid Oxide Fuel Cells (SOFC)

We are nowadays faced with the exhaustion of oil resources and fuel cells appear to be a promising way to produce energy. In this field Solid Oxide Fuel cells (SOFC) are of considerable interest. Their principle is based on an oxide ion conductor solid electrolyte membrane which separates two compartments, one containing oxygen, the other containing hydrogen or methane. Because of the difference of chemical potentials between these two compartments, oxygen is dissociated at the cathode into oxide ions which migrate through the dense electrolyte and react at the anode with the hydrogen or methane molecule to produce water and electricity.

The Solid State Chemistry group from the Catalysis and Solid State Chemistry Laboratory (UCCS) is specialised in the synthesis and characterization of new oxides. The Solid Oxide Fuel Cell (SOFC) technology is under interest and especially the investigation of electrolyte (pure oxide ion O^{2-} conduction) or electrode materials (mixed conduction: oxide ions O^{2-} and electrons e^-), which could be used not only in Solid Oxide Fuel Cells, but also oxygen sensors, oxygen generating systems, catalytic reactors, high temperature electrolyzers, ...

This Erasmus project is focussed on the study of new materials, which could be used as electrolyte or electrode materials. The phases will be prepared by solid state reaction and characterised using X-ray diffraction, DTA/TGA, impedance spectroscopy. The ceramic sintering conditions will be optimised in order to get dense membranes (dilatometry, SEM) for electrochemical measurements.



Solid Oxide Fuel Cell (SOFC)

Key words: Solid Oxide Fuel Cell, electrolyte, electrode, ceramic, solid state chemistry, electrochemistry

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