

Chemical Engineering Seminars – HT 2008

Week 7: Tuesday 26 February, 4:15 - 5:15 pm
Lecture Room 2, Thom Building, Engineering Science

Direct Ammonia Fuel Cells

Dr. Klaus Hellgardt

Department of Chemical Engineering and Chemical Technology. Imperial College

Abstract

A novel solid oxide fuel cell (SOFC) is described operating on ammonia as hydrogen (fuel) carrier; atmospheric oxygen is reduced at a silver cathode, migrates across an oxide ion-conducting membrane, to a catalytic metal or metal/cermet anode, at which ammonia is directly oxidised to nitrogen and water. Compared to compressed hydrogen, ammonia provides >4 times greater energy density, achieves 10% increase in power density, and obviates difficulties of storing and transporting hydrogen. Ammonia fuel cells utilising novel proton ion conductors will be explored as well as the reversal of such fuel cells for the purpose of ammonia synthesis at atmospheric pressure.

Bio-sketch

Klaus Hellgardt is a Senior Lecturer in the Department of Chemical Engineering at Imperial College London (ICL). He graduated in 1990 with a Dipl.-Ing.(TH) from the University of Karlsruhe. He was then awarded an EU mobility grant (now Marie Curie fellowship) to study for a PhD and DIC at Imperial College London (1994). In 1995 Klaus was appointed to a lectureship at Loughborough University where he taught until 2005, when he moved back to his alma mater (ICL). In 2003 Klaus was awarded the title of EurIng by the FEANI (the European federation of national engineering societies). He sits on the board of a number of companies (Britest Ltd., CTI-Labs AG) and is a member of the Imperial College - Foster-Wheeler steering group. He frequently acts as expert referee for foreign research councils and has just returned from a 6-month visiting professorship at the University of Tokyo. Klaus' research deals with many aspects of advanced reaction engineering and applied catalysis, with specific emphasis on smart fuels engineering, membrane science and flux response technologies.