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Small Compact and Portable Fuel Cell Systems

Fuel cells which transform the chemical energy in a hydrocarbon fuel and air directly into electrical energy have been an aim of electrochemists for nearly 70 years. Such a fuel cell conveniently fuelled by alcohols, principally methanol, would ideally have a high specific energy and be environmentally friendly, compared to the more traditional batteries presently available, in terms of recycling the materials of construction.

The major drive in fuel cell research has been towards producing mobile units that can power vehicles and towards static power supplies for local facilities, sometimes in remote locations. However these are generally fuel cells of 50 kW to MW size. There is a market for smaller, portable fuel cells for use in small-scale electrical equipment. These will have to operate at modest temperatures, be mechanically robust and show a high energy and power density for compactness.

For a small and cost effective direct methanol fuel cell showing high energy and power density there is a requirement for better electrocatalysts, and for the prevention of methanol crossover, which is the diffusion of methanol to the cathode. This results in a degraded performance through fuel loss and depolarisation of the air electrode. To overcome this an ultra-thin pore-free electrode – or barrier – made from transition element metals, such as palladium, which is permeable to hydrogen ions but excludes water and hydrocarbon fuels, has been developed. The metal membranes are formed by vacuum-deposition coating and plugging the pores of an etched nuclear particle track membrane. This membrane can be placed at either electrode or between them.

The use of a dielectric porous substrate onto which one or more fuel cells can be formed by vacuum deposition, has enabled multiple fuel cells and series connections to be made on the substrate, in a similar way to printed circuits (1, 2). These fuel cells, directly powered by methanol, and using small amounts of platinum as the electrocatalyst, could provide significant economic advantages when reduced to micro proportions. Together with advances in electrocatalysts (3) and with reduced methanol crossover, there are opportunities for using such small compact fuel cells as an effective alternative to current battery technology for powering a whole new range of portable electronic applications.

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Conference on the Chemistry of the Platinum Group Metals

The Seventh International Conference on the Chemistry of the Platinum Group Metals will be held at Nottingham University, England, from the 25th to 30th July 1999. Organised by the Dalton Division of the Royal Society of Chemistry, these conferences take place every three years, earlier ones having been held in Edinburgh, Sheffield, Cambridge, St. Andrews and York. Professor Martin Schröder is the convener.

Those who have accepted an invitation to speak in plenary and keynote lectures include: M. Abrams, G. S. Attard, C. Bianchini, D. G. Blackmond, H.-U. Blaser, B. Chaudret, R. H. Crabtree, N. Farrell, M. Fujita, R. H. Grubbs, B. F. G. Johnson, J. M. Kelly, G. van Koten, P. W. N. M. van Leeuwen, D. M. P. Mingos, K. Nozaki, L. A. Oro, P. G. Pringle, R. A. van Santen, J. P. Sauvage, M. D. Ward, V. W. W. Yan, L. J. Yellowlees, A. von Zelewsky and T. Ziegler.

Oral and poster contributions are welcomed. Persons wishing to submit either should send an Abstract, in the prescribed format, by 18th January 1999, to Dr John F. Gibson, 99PGM7, The Royal Society of Chemistry, Burlington House, London W1V 0BN; Fax: +44(0)171 734 1227; e-mail: Conferences@rsc.org.