In contrast to traditional membrane development – a synthesis-intensive process with many distinct steps – the partners are taking a 'formulation approach'. This involves selecting a number of different polymers, each picked for a specific property, then combining the polymers in one mixing step so the final material retains all of the desired properties.

Although combinatorial methods have been used in drug discovery, Meredith is pioneering their use in fuel cell technology. He has developed a technology for depositing large collections of polymers on a single microscope slide, using property gradients to create thousands of variations in composition, temperature and thickness.

'Combinatorial methods allow us to search through possibilities much more efficiently,' explains Meredith. 'We can run through hundreds of materials in just a couple of hours.'

Meredith presented details at the recent ACS 2006 national meeting in San Francisco.

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Oxford Catalysts wins fuel cell grant

In the UK, Oxford Catalysts Group has been awarded £118 000 (US$225 000) by The Carbon Trust to help finance a two-year project to develop reforming catalysts for fuel cells. This award is part of a £150 000 joint grant to both the company and a leading UK-based solid oxide fuel cell company, initially awarded in March, subject to the contract which has now been agreed.

The program will focus on development of two catalysts for reforming of LPG and natural gas, based on the firm's patented metal-carbide catalyst platform. The project will also involve optimization of the new catalysts, and development of a process for their deposition directly onto an appropriate surface.

Oxford Catalysts believes that its new deposition process could facilitate more efficient catalyst performance and more effective heat transfer in the catalyst active area, thereby enhancing the overall efficiency of the fuel cell system.

The other project partner [*not identified, but likely to be Ceres Power*] will utilize its experience in fuel cell systems using LPG and natural gas to define the specifications for the new catalysts and to test their performance.

Oxford Catalysts has two key platform technologies. The first is for a novel class of catalysts made from metal carbides which, for certain reactions, can match or exceed the benefits of traditional precious metal catalysts at a lower cost.

The second platform relates to chemical reactions involving a liquid fuel containing an alcohol (such as methanol), hydrogen peroxide and water. The company's catalyst can be used to release hydrogen from this fuel, instantaneously starting from room temperature.

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NexTech, Plug Power developing SOFC system

US firms NexTech Materials and Plug Power are collaborating to jointly develop a solid oxide fuel cell system. They plan to complete a number of joint activities including market research, fuel cell stack development and testing, system design and prototype construction.

The initial target market is the military, in particular US Air Force and Army applications. Other potential markets include wireless communications and commercial stationary backup.

Project partners include the Ohio Department of Development, which is instrumental in providing seed funding through the Third Frontier Program, and Case Western Reserve University, which will develop testing methodologies to help minimize the development cycle time, through work at the Wright Fuel Cell Group.

Previously Plug Power has focused on small-scale PEM fuel cell technology, and has a number of systems in completed or ongoing field trials; this is the first time that it has publicly ventured into the SOFC arena. NexTech is a leading developer and manufacturer of SOFC and fuel processing components and materials.

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Wal-Mart centers trial Cellex fuel cell units

Fourteen fuel cell power units from Canadian-based Cellex Power Products are being trialled for four months in two Wal-Mart distribution centers in Ohio.

The objective of the trial is to demonstrate whether Cellex fuel cell products provide superior performance and health and safety benefits compared with incumbent lead-acid battery technology for businesses operating large fleets of forklifts. The project, a consortium led by Cellex, will receive a US$1m grant through Ohio's Third Frontier Fuel Cell Initiative.

The Cellex CX-P150 units use Ballard Mark 9 SSL PEM fuel cell stacks. In addition to consortium players, the project has other Ohio ties. One of largest electric forklift manufacturers in North America, Crown Equipment Corporation of New Bremen, has supplied pallet trucks for the Grove City distribution center, while OKI Systems, a forklift truck servicing dealer, is providing service and support.

'Cellex's CX-P150 power units currently in use at these two Wal-Mart centers increase productivity by enabling trucks to stay on the floor longer and provide environmental benefits, such as eliminating the need to handle lead and acid that is required for industrial batteries,' says Tom Hoying, vice president of sales and marketing for Cellex.

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Delphi SOFC satisfies performance and cost requirements

US-based Delphi Corporation says that it has achieved all of its goals for solid oxide fuel cell performance, efficiency and cost during the first phase of its project in the Department of Energy's Solid State Energy Conversion Alliance (SECA) program.

The company says the achievement marks a significant step towards the SECA goal of a market-ready, affordable SOFC by 2010, and enables it to enter the second phase of the SECA program.

A recently completed demonstration showed that the Delphi SOFC was capable of producing peak power of 4.24 kW using methane, to achieve the SECA goal of 3–10 kW. It demonstrated a peak efficiency of 37%, exceeding the goal of 35% for small stationary systems, and met the durability goal by achieving a power degradation of 7% during 1500 operating hours. It also attained an estimated cost of $767 per kW for volume production.

In phase one of the SECA program, DOE established a number of goals aimed at moving fuel cell development towards a 2010 target date for low-cost units ready for the commercial market. The ultimate goal is to reduce the cost to $400 per kW, which would make fuel cell energy competitive with conventional power sources.