

Project Title: 'Porosimetry equipment for the elucidation of the structural architecture of novel materials developed for fuel cell technologies.'

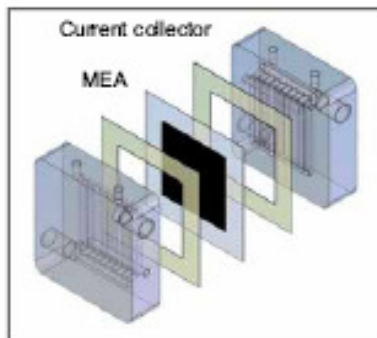
Principle Investigator: Dr S Holmes (University of Manchester)

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One of the solutions put forward for the demand for a clean, efficient form of energy production is the use of hydrogen, in particular hydrogen fuel cells, and the development of the 'hydrogen economy'. The 'hydrogen economy' is a term for a hypothetical future economy where hydrogen is the dominant form of stored energy, the manner in which the UK and other countries might adopt such an economy, is currently the subject of much discussion. A key technology for the hydrogen economy is the hydrogen powered fuel cell, and it is widely believed that the Polymer Electrolyte Membrane (PEM) fuel cell will be used for automotive applications.

Most of the materials which are used in fuel cells are complex, porous structures which incorporate expensive materials such as Platinum, Ruthenium and Fluorinated polymers. If the development of these materials is to proceed it is vital that researchers can probe the shape and size of the pores and void spaces within them so that they can be optimized to produce best performance. This is because all of the properties of the



fuel cell can be directly related to the pore structure of the various components it is vital a researcher can find out the structure so that the best material characteristics can be obtained. For this project equipment will be purchased which will enable the internal geometry of fuel cells to be determined. This will be done by forcing mercury at extremely high pressures into the material to measure the shape and size of the internal structure. The total internal volume of the material will be determined by measuring how much Helium it takes to fill the structure.

This project will provide a facility to enable advances in PEM fuel cell materials as well as in their design and operation. The analytical equipment will enable the researchers and industry in the North West and elsewhere in the UK with an interest in fuel cells, to evaluate new catalysts and other materials which are constantly being developed for fuel cell applications. The aim of this proposal was to provide a vital analytical facility for materials research related to Polymer Electrolyte Membrane (PEM) Fuel Cells. The School of Chemical Engineering and Analytical Science, in collaboration with other Schools and Universities has carried out a significant amount of work into the development of these Fuel Cells to facilitate the production and commercialisation of this hugely important energy supply technology. In addition to its use for research, the system will provide an invaluable demonstration tool to showcase the capabilities of the University of Manchester in this fast moving and vital field of research. Several of the research proposals which will benefit from this equipment have links to North West Industry.