

Porosimetry Equipment For the Elucidation of the Structural Architecture of Novel Materials Developed for Fuel Cell Technologies-
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Summary

Despite the demonstration of the fuel cell by Sir William Grove in 1839 the development of fuel cell technology has been slow in comparison to other power sources such as the internal combustion engine. The reasons for the slow evolution of fuel cells are mainly economic and materials based. The material problems are gradually being overcome and as primary energy sources are becoming less abundant and more expensive; so fuel cells are becoming a more viable option. How rapidly fuel cells begin to impact significantly upon our everyday lives depends on how rapidly the remaining technical challenges can be met.

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. Obviously, if the development of these materials is to proceed it is vital that the researchers can probe the shape and size of the pores and void spaces within the materials so that they can be optimised to produce the best performance. The equipment which will be purchased will enable the internal geometry of these structures to be determined. By forcing mercury at extremely high pressures into the materials the shape and size of the internal structure can be measured. The pressure needed to force the mercury into the material can be related to the shape and size of the voids. Helium atoms are so small that they can completely fill the structure of a material. The volume of Helium needed to fill the structure gives you the total internal volume of a material. By combining the two measurements the internal pore structure can be determined.

As all of the properties of a fuel cell can be related directly to the pore structure of the various components it is vital that a researcher can find out the structure so that the best material characteristics can be obtained.