$SrTiO_3$ (bg = 3.2 eV), are completely stable towards illumination, but these compounds absorb only a very small fraction of the solar spectrum. However, recent work has shown that it might be possible to stabilise semiconductors against photocorrosion by loading the surface with highly efficient catalysts (5). Thus, in the case of CdS (bg = 2.4 eV), which undergoes rapid anodic photodecomposition, loading with small amounts (about 1 per cent w/w) of RuO_2 results in a drastic improvement in stability. These systems are being investigated in many laboratories around the world and rapid progress should ensue.

Acknowledgement

We thank the Science and Engineering Research Council and the European Economic Community for financial support of this work.

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Multi-Megawatt Fuel Cell Produces Electricity

PLATINUM CATALYSTS PROMOTE EFFICIENT ENERGY CONVERSION

The Tokyo Electric Power Company (TEPCO) has recently commenced a year-long test of their 4.5MW demonstration fuel cell power plant, manufactured by United Technologies Corporation and incorporating platinum catalysts supplied by Johnson Matthey, at the Goi power station complex in Ichihara City.

In a special bulletin the Fuel Cell Users Group of the Electric Utility Industry, in the United States of America, reported that the Japanese plant first produced electricity on April 8th, 1983 and at the time of the announcement had accumulated over 55 hours of operating time at 2.4MW. Testing will continue to verify operating conditions and performance characteristics, and to provide data that will help to determine the potential of fuel cell technology for commercial power generation.

The plant, which is designed to have an average output of 4.8MW direct current — converted to 4.5MW alternating current for utility use — and a service life of twenty years, is a modified version of another United Technologies demonstration fuel cell power plant now in the final stages of preparation for operation by Consolidated Edison Company of New York, Inc. in Manhattan, New York City. The latter is an interim result of a research and development programme initiated in the early 1970s by a group of U.S. electric utilities and the U.S. Government to explore the feasibility of building and operating 27MW fuel cell generators, a size that would be suitable for the needs of 80 per cent of municipal and rural electricity producers in the United States. Although this demonstrator unit has not yet produced power, experience gained with it has already enabled improvements to be incorporated into the design of an 11MW commercial plant now being planned by U.T.C.

Characteristics of Fuel Cells

The basic advantage of a fuel cell is its efficiency in converting chemical energy into electricity and heat, which is maintained over a wide range of operating loads, combined with an ability to respond quickly to load changes. Low levels of emissions, quiet operation and a minimal requirement for water are features that make installation of fuel cell power plants acceptable in environmentally sensitive areas close to the point of power requirement.

The TEPCO generator system was installed in less than two years, demonstrating an advantage of modular construction that will enable capacity to be increased incrementally and rapidly in response to growing demands. In addition TEPCO have postulated siting modules in multi-storey buildings, so saving space in areas with a high population density.

On the basis of accumulating experience with numerous kilowatt units and the two multi-megawatt demonstration plants, it seems most probable that phosphoric acid fuel cells incorporating electrodes catalysed with platinum group metals will make a significant contribution to the efficient commercial generation of both heat and electrical power over the next few decades.