sufficient numbers to meet even the 1998 requirements of California. With this in mind, therefore, California believes that if the manufacture of electric vehicles is established in their state it will be a way to overcome an obvious shortcoming, and will create jobs for their declining defense industry.

Technical Advances

No significant advances in PAFC technology were disclosed at this conference, other than those concerned primarily with the systems engineering. However, significant developments were announced in PEM and direct methanol fuel cell (DMFC) technologies.

Progress in their work on PEM fuel cell materials and stacks was outlined by S. Gottesfeld, from the Los Alamos National Laboratory. A 20 kW stack with a 40 kW peak power capability for use in vehicles has been built and endurance tested for 4000 hours. Possible shortcomings in the application of this system to vehicles, such as freeze/melt cycles, have been evaluated and found not to be deleterious. Improvements to the cell and stack power outputs have been obtained using microporous gas distribution plates in preference to ribbed graphite. A 2 per cent oxygen bleed to the hydrogen fuel stream was found to be beneficial in reducing carbon monoxide poisoning effects at the anode.

Confirmation of an improved proton exchange material, which has been developed and manufactured by DuPont was also discussed. This improved polymer electrolyte, used with existing catalyst and electrode technology, enables significantly higher power densities to be achieved. J. Maceda of H Power reported that they had obtained a 100 mV improvement in cell potential using this new membrane.

If there was further development, the use of direct methanol fuel cells would provide an attractive alternative to hydrogen fuelled alkaline, phosphoric or PEM systems. However, to date power densities required for mobile applications using DMFC have not been achieved, despite extensive work in Europe and America in the last 10 years. Thus, work described by G. Halpert, Jet Propulsion Laboratory, to develop a cell system with power densities compatible with vehicle applications was therefore particularly noteworthy. Unfortunately, no details are yet available of the catalyst and electrode materials or the system that is used.

Fuel cells provide clean technology, and apart from being used in space vehicles and some special niche applications, such as "breathalyser" units, have so far promised a great deal but have not yet achieved acceptable commercial status. This conference, organised by SCAQMD with the determination to utilise innovative approaches to improve air quality, was therefore particularly timely in the ongoing development of fuel cell applications. As it is intended that this conference should become a biannual event, the next conference scheduled for 1996, with the stimulus of demonstrations of further stationary and mobile fuel cell units, will be of considerable interest not only to those who have supported fuel cell development, but more particularly to those who will directly benefit from its application. G.J.K.A.

Platinum Metals in Commercial Glassmaking

Metals in Glassmaking, Glass Science and Technology 13

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The history of the significant contribution made by the platinum metals to the development of high quality glass is presented later in this issue. Coincidently, an English language edition of a book giving the most relevant information about the many metals used in glassmaking has just been published. One twenty-three page section is concerned with the properties of the platinum metals that establish their suitability for specific applications in the glass industry. This includes a list of guidelines indicating how to ensure the most advantageous use of the platinum metals for this purpose. The literature cited covers the period up to the late 1980s, therefore no mention is made of the benefits that can accrue from the use of innovative A.C.T.™ technology, recently made available by Johnson Matthey, see *Platinum Metals Rev.*, 1993, **37**, (1), 62–70.