While it is generally agreed that platinum-rhodium and palladium-rhodium three-way catalysts are the best means of achieving the control of pollutants from cars, discussions continue about the development of the monoliths used as the catalyst support medium, with the objective of maximising the contribution the monolith makes to the performance of the whole catalyst. J. P. Day and L. S. Sucha of Corning analysed the substrate parameters influencing pressure drop and efficiency of the catalyst system, while M. Machida and J. Kitagawa of NGK Insulators, in collaboration with H. Yamamoto and F. Kato, Nissan, concentrated on the warm-up characteristics of thinner wall, low bulk density ceramic substrates. Metallic supports also received a lot of attention; F.-W. Kaiser and S. Pelters, of Porsche, compared the results obtained from a number of metal substrates with different cell densities, all coated with a similar platinum-rhodium catalyst formulation (5:1), at a loading of 50 g/ft^3.

Control of emissions from diesel engine vehicles, especially particulate emissions, achieved a new prominence this year, with a number of sessions devoted to this subject. With catalysed systems, aimed at in-situ regeneration, the common problem considered in many papers was the formation of sulphates arising from fuel-derived sulphur.

Catalysts which give good reduction of carbonaceous particulate matter are usually also good catalysts for further oxidation of the sulphur dioxide formed in the fuel combustion process. P. Zelenka of AVL, together with E. Lox and K. Ostgathe of Degussa offer the opinion that platinum-based catalysts provide the best guarantee of low tailpipe emissions and low rates of deterioration. This is due to their good performance at low temperatures (where the rate of sulphate formation is low), and their resistance to poisoning by oil additives. These authors conclude that, in addition to catalyst performance, careful optimisation of the engine combustion parameters is essential for success. Given the potential for better fuel economy, and hence reduced carbon dioxide emissions from diesel engines and their generally lower levels of gaseous pollutants compared with those for the corresponding petrol engines, interest in catalytic systems for the reduction of particulates and odours from diesel engines is likely to grow. D.E.W.

Binary Coatings for DSA®-type Electrodes

Prior to the development of dimensionally stable electrodes (DSA®) in the late 1960s, the production of chlorine and chlorate via the electrolysis of brine generally made use of graphite electrodes. Graphite electrodes required frequent maintenance, but DSA® electrodes preserve both their shape and their voltage characteristics, and facilitate significant electrical power savings. They consist of a thin active coating, capable of catalysing the desired electrochemical reaction and of passing the electric current between a base metal support and the interface of the electrode with the electrolyte. The coating consists of a noble metal oxide mixed with a conducting or non conducting stabilising oxide, while the support is generally a valve metal such as niobium, tantalum, titanium or zirconium.

Such anodes have been considered for a variety of electrochemical processes, and a communication from the Swiss Federal Institute of Technology, Lausanne, reports a systematic investigation of nine binary coatings made during the continuing search for a DSA®-type electrode suitable for oxygen evolution in concentrated sulphuric acid solutions (Ch. Comninellis and G. P. Vercesi, *J. Appl. Electrochem.*, 1991, **21**, (4), 335–345).

On the basis of cost and performance titanium, which is used in most conventional DSA® applications, was selected as the base metal. The binary coatings consisted of a conducting oxide (RuO_2, IrO_2 or $PtO_{0.12\pm0.05}$) and a non conducting stabilising component (TiO_2, ZrO_2 or Ta_2O_5), and compositions ranging from 10 to 100 per cent of conducting oxide were tested. The results are discussed.

It was concluded that the titanium electrode coated with IrO_2 and Ta_2O_5, 70 and 30 mol per cent, respectively, was the best tested. It also displayed the best catalyst dispersion and gave the longest service life.