titanium and rapid corrosion of the underlying copper have also been experienced.

More recently a variety of metallurgically bonded rod anodes have become available, which have a number of advantages over platinised titanium rod. Tibond is available as rod 2 to 20mm diameter with a clad coating of platinum (5 to 50 μm thick), and with or without a copper core. Niobond, in which the titanium is replaced by niobium, is available in similar forms, but additionally a steel core can be provided for the larger section rod if high strength is required. Figure 5 shows a section of copper-cored Niobond. These materials are available in long lengths (up to 90m for 2mm diameter and up to 12m for 20mm diameter), either sealed at one or both the ends, or unsealed. Platinum is susceptible to marine fouling, and since the anodes may be exposed to sea water for some time before commissioning, a further refinement is to apply an anti-fouling clad layer of copper over the platinum, which is removed rapidly when the anode is first polarised. Figure 6 illustrates the most complex form of Niobond, which has been machined to reveal the various materials composing the composite anode, that is a core of steel for improved mechanical strength, a layer of copper for improved electrical conductivity, a layer of niobium for corrosion resistance, a layer of platinum, and an outer layer of copper which prevents marine fouling of the anode prior to energising; Figure 7 shows a section of the anode.

The non-porous layer of platinum is an obvious improvement on electroplated platinum, and comparatively thick layers may be used where conditions are severe and where long life is required.

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The second part of Dr. Shreir's review will be published in the January 1978 issue of Platinum Metals Review.

Catalysts for Automobile Emission Control

While the hydrocarbons and carbon monoxide emitted from automobile exhausts can now be catalytically oxidised very satisfactorily a number of different approaches are still being pursued for the control of nitrogen oxides. In a recent paper J. C. Schlatter and K. C. Taylor of General Motors Research Laboratories report work carried out on the addition of platinum and palladium to rhodium catalysts to improve their oxidising capacity when used for the simultaneous control of all three pollutants (*J. Catalysis*, 1977, **49**, (1); 42-50). It was found that an improvement could be achieved in the laboratory and initial associated disadvantages were later avoided.

The results obtained using laboratory feedstream are not always substantiated when engine exhaust tests are carried out and these have still to be done. It is however reported that for enhanced performance the platinum or palladium, should not be deposited on the same support beads as the rhodium. The two sets of beads can then be separately positioned, with the rhodium catalyst in the front of the catalytic bed. In this way each material is in the environment most suited to its catalytic purpose.