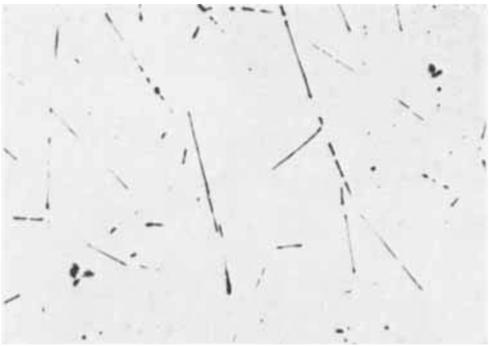

Fig. 14 As cast carbon-platinum ingot after heating in air for 90 hours at 1400°C. ×75

by Fig. 14 which shows the cross-section of a duplex carbon-platinum alloy which has been annealed in air at 1400°C for 90 hours.

Before annealing, this specimen exhibited a microstructure comparable to that illustrated in Fig. 1. No graphite was observed in the section following the anneal in air, and the voids marking the outlines of the original primary graphite flakes were seen to break up and spheroidise as the heat treatment became more prolonged.

The prospects for carbon-palladium alloys are rather more attractive. The strengthening effects are considerable and it is possible that the precipitation of graphite from super-saturated palladium-based alloys could lead to the development of self-lubricating electrical slidewire resistances. It is not yet known whether the presence of dissolved carbon will accelerate or inhibit the diffusion of hydrogen through palladium. Since the solubility appears to be interstitial, further exploration in the low temperature regions of the solubility diagram might possibly reveal the existence of a miscibility gap similar to that observed in the hydrogen-palladium system. The greatly extended lattice parameter of these alloys might also influence the behaviour of palladium catalysts.

Accurate determinations of the rate of diffusion of carbon through platinum and palladium would indicate whether either of these metals could be seriously considered as a semi-permeable membrane for carbon.

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Spot Welding Platinum Foil on Titanium Anodes

Titanium anodes coated with platinum are used in many cathodic protection applications. Electrodeposited platinum is usually only a few micro-metres thick but for certain processes there is a platinum loss which calls for a layer of greater thickness. Hence, for example, platinum foil is used on the anodes that protect the drying cylinders of paper-making machines against the corrosive effect of the cooling sea water (1). For anodes used in this way, foil is cheaper per unit weight than electrodeposited platinum and the platinum loss is much less.

A. Baggerud of the Technical University of Norway reports (2) that spot welding of platinum foil to titanium has produced anodes which have protected drying cylinders successfully over several years. The method is reliable and no selective corrosion of the foil at the spot welds has occurred.

Baggerud has developed specifications for 30 and 50μm foils and tolerance limits for the welding current have been determined. Melting of the platinum foils must be minimised during welding lest magneto-hydrodynamic effects cause the formation of brittle intermetallic compounds. Oxides on the titanium surface have little effect on weldability and the Peltier effect is no real hindrance.

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