ings. In the first (1), B. A. Macklin and J. C. Withers, of General Technologies Corporation, Reston, Virginia, investigated the use of iridium trichloride, iridium tetrachloride, iridium tribromide, and the expensive iridium hexafluoride, to produce iridium coatings on graphite.

Iridium trichloride or tetrachloride can both be decomposed thermally at 800°C or reduced with hydrogen or carbon monoxide at a slightly lower temperature, 700°C. The presence of traces of water also appears to lower the decomposition temperature. It is suggested that an intermediate species of the form $IrCl_x(OH)_yCO_z$ may be produced. The best results were obtained when the graphite substrate was heated to 825° to 975°C using a stream of hydrogen mixed with twice to four times its volume of carbon monoxide to carry iridium trichloride vaporised at 150° to 300°C. No advantages were observed through the use of the tetrachloride or bromide, but by using iridium hexachloride carried in a mixture of argon, hydrogen, and carbon monoxide at a low pressure, very fast rates of deposition of the order of 0.5 mil/hour were achieved on graphite rods heated to 775°C. Two other compounds, iridium acetylacetonate and bis-cyclopentadienyl iridium hydride, have also been considered, and may have advantages through their freedom from halides.

Organometallic Compounds

In the second paper (2), J. A. Papke and R. D. Stevenson, of Ethyl Corporation Research Laboratories, Ferndale, Michigan, describe experiments with two organometallic compounds, acetylacetonato (1,5-cyclooctadiene) iridium (I) and di-μ-methoxybis (1,5-cyclooctadiene) diiridium (I). With both compounds, amorphous and presumably powdery deposits were formed unless the deposition conditions were carefully controlled, but good deposits of 90 to 95 per cent purity were obtainable on copper discs heated to 600 to 750°C at pressures of about 0.2 torr.

Generally speaking, chemical vapour deposition appears capable of deposition rates three to six times as fast as those common in electrodeposition practice and has exceptional throwing power. Provided that conditions can be established which will ensure removal of the gaseous products of the reaction it seems to offer promise of being able to produce sounder and more uniform deposits on hot substrates than can be obtained by any other plating process.

J. C. C.

References

1 B. A. Macklin and J. C. Withers, "The Chemical Vapour Deposition of Iridium", Proceedings of the Conference on Chemical Vapour Deposition of Refractory Metals, Alloys and Compounds, 1967, 161–173

2 J. A. Papke and R. D. Stevenson, "Evaluation of Metal-Organic Compounds as Materials for Chemical Vapour Deposition", *ibid.* 193–204

Palladium and Rhodium: Russian Reviews

A valuable summary of knowledge concerning palladium has been published recently by the "Nauka" publishing house in Moscow. This is "Splavy Palladiya" (Palladium Alloys), 1967, 214 pp, by E. M. Savitskii, V. P. Polyakova and M. A. Tylkina of the Institute of Metallurgy named for A. A. Baikov. Part of the information is from original work by these scientists but the majority of it is a thorough review of international effort, fully referenced.

The book is divided into three main sections: the first deals with the occurence, extraction and fabrication of palladium, with the physical and mechanical properties of the metal, and with its chemical reactions and salts; the second part deals with the properties of the alloys; the third part describes the uses of the metal and its alloys.

This comprehensive study is not the first of its type. In 1966 "Nauka" published I. A. Fedorov's "Rhodium", which has a similar type of coverage but, since Fedorov works at the Institute of General and Inorganic Chemistry named for N. S. Kurnakov, puts greater emphasis on the chemical compounds of the metal.

If such reviews are to be extended to the remaining platinum metals then a very valuable record of Russian interest in this field will be available.

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