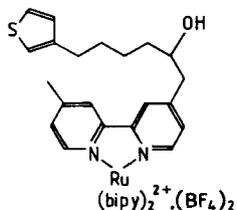


and electroluminescent properties as modified electrodes, was reported by J. A. Crayston of the University of St. Andrews. He discussed the synthesis of a monomer containing the



$\text{Ru}(\text{bipy})_2^{2+}$ group, see above, in which one of the bipyridyl ligands is linked to a thiophene group. This monomer readily polymerises to

yield a modified electrode with both electroactive ruthenium(III) and ruthenium(II) attached to polythiophene chains.

The conference provided an in-depth insight into the current state of platinum group metal chemistry. Recent results from both academia and industry were very much in evidence both in the form of lectures and in the poster presentations. The academic research is clearly becoming more targeted towards commercial applications, which is much to be welcomed, although there is a need for a degree of fundamental research. The next conference in the series is scheduled to be held at the University of York in 1996.

Iridium Coatings on Structural Carbon Materials

Carbon reacts rapidly with oxygen at temperatures as low as 800 K and therefore carbonaceous materials intended for high temperature structural applications have to be protected against oxidation. Silicon- or boron-based coatings can provide reasonable protection for limited times at temperatures up to about 1700 K, but above this other refractory coatings are required.

Iridium appears to be a favourable material for such coatings for the following reasons: it melts at 2713 K, it has a very low permeability to oxygen, it does not react with carbon below 2553 K and it forms an excellent barrier to carbon diffusion. The preparation of iridium coatings on carbon-based materials, their structure, and the effects of mismatch in the thermal expansions have not been widely reported. Now a group of researchers at Tohoku University, Sendai, Japan, have published the results of their investigations of the surface and growth morphology, and the structural changes of iridium coatings on carbon materials (K. Mumtaz, J. Echigoya, T. Hirai and Y. Shindo, "R.f. Magnetron Sputtered Iridium Coatings on Carbon Structural Materials", *Mater. Sci. Eng.*, 1993, **A167**, (1-2), 187-195).

Iridium was deposited by radio frequency magnetron sputtering onto isotropic graphites and carbon-carbon composite substrates held either at room temperature or 1073 K, and the coatings were examined in the as-deposited state and after heat treatment. Regardless of substrate temperature, columnar grained homogeneous coatings were obtained, with those deposited at room temperature having the finest grain size. However, coatings deposited onto substrates held at 1073 K were denser and less

strained. After heat treatment in nitrogen at 1973 K or 2173 K iridium coatings which had been deposited at 1073 K onto isotropic graphite having a coefficient of thermal expansion of approximately $7.6 \times 10^{-6}/\text{K}$ were crack-free. Furthermore there was no outward diffusion of carbon, no dislocations were observed and porosity was either reduced or eliminated from the equiaxial grain structure.

Palladium in Cholesterol Sensors

Since the first discovery of the connection between high cholesterol levels in human serum and various diseases, such as heart disease and arteriosclerosis, there has been a need to develop a fast, accurate method to measure its level.

Now, a team at Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, has developed a fast response cholesterol sensor based on an amperometric enzymatic technique, using a layer of palladium electrodeposited on a glassy carbon electrode (S. Dong, Q. Deng and G. Cheng, *Anal. Chim. Acta*, 1993, **279**, (2), 235-240).

The dispersed palladium particles electrocatalysed the oxidation of hydrogen peroxide giving a large decrease in overvoltage. Cholesterol oxidase was immobilised on the electrode by cross-linking with glutaraldehyde. A layer of poly(o-phenylenediamine) film was electropolymerised on the enzyme layer thus preventing interference from uric acid and ascorbic acid and increasing the thermal stability of the sensor. The sensor had a response of less than 20 seconds in a concentration range 0.05-4.5 mmol/l. The sensor can be used for 200 assays without any decrease in activity.