

Notton and R. J. Potter, on rods returned by Fleischmann and Pons from their Utah laboratory. The results showed that a number of elements including platinum, silicon and lithium had been deposited on the surface of the palladium during the electrolysis in heavy water. The unique role which could be played by lithium in these experiments was indicated both by temperature programmed hydrogen absorption/desorption profile measurements and by electrochemical investigations, together with a time of flight SIMS experiment which indicated a possible reduction in the $\text{Li}^6:\text{Li}^7$ ratio found on the surface of an active rod (5).

The production of 30 per cent excess heat from experiments using a palladium cathode and a palladium anode, thus avoiding the possibility of platinum deposition on the cathode, were reported by A. De Ninno and co-workers from ENEA, Frascati, Italy.

With regard to the key factor of achieving the maximum deuterium:palladium ratio, interesting results were reported by T. Sano, T. Terasawa, T. Ohi, and S. Nezu of IMRA Material R and D, Kariya, Japan. These results showed that alloying with silver or cerium markedly reduced hydrogen:palladium loading ratios, but neither annealing nor swaging of pure palladium samples produced a significant effect.

Conclusions

The production of He^4 , neutrons and tritium from cold fusion experiments indicates the nuclear origin of the phenomena. The size and reproducibility of the excess enthalpy effect continue to be under study in laboratories in many parts of the world, and the focus of the current effort is in Japan. One key requirement for the observation of the excess heat effect, that is a high deuterium:palladium loading ratio has been proposed and supported by experimental results. This is not the only significant variable, however, and many others are under investigation, and the effect cannot yet be reliably reproduced on demand. The mechanisms producing these effects are as yet poorly understood, although many theories were advanced at this conference, and the reason for the disparity between the quan-

tity of nuclear particles and the excess heat recorded seems to indicate that the results of more than one effect are being observed. However, significant progress should soon be made now that increased funding is available in Japan.

D.T.T.

References

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Platinum-Aluminide Coatings

The improvement in environmental resistance that platinum-aluminide coatings can impart to some of the nickel-base superalloys used by the gas turbine industry has resulted in much interest in combinations of these materials. Now a further paper by investigators at the King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, and at Rolls-Royce, Bristol, England, reports on the effect of substrate composition on the oxidation behaviour of selected platinum-aluminised nickel-base superalloys, with particular emphasis on the thermal stability of the coating and on microstructural features of the surface scale (H. M. Tawancy, N. M. Abbas and T. N. Rhys-Jones, *Surf. Coat. Technol.*, 1992, **54/55**, (1-3), 1-7).

Platinum-aluminide coatings were applied to polycrystalline, directionally solidified and single-crystal superalloy rods before they were oxidised in still air at temperatures of 1000 and 1100°C. The microstructures were characterised by analytical electron microscopy, scanning electron microscopy and X-ray diffraction. Interdiffusion between the surface coatings and the substrates occurred at both temperatures. Variations in the protective nature of the coatings were believed to result from the outward diffusion of elements from the substrate. Refractory and reactive elements appeared to have the most significant effects. The beneficial and adverse effects of these elements are discussed. It is concluded that although the refractory elements tend to degrade the protective nature of the scale developed on the coating, the presence of the reactive elements can outweigh these adverse effects.