emphasis appears to have moved from issues of stack technology to issues of cost and the development of processes that are suitable for mass production.

The full proceedings of this Conference, published by the International Hydrogen Energy Association, are currently available in three volumes. M.L.D.

Problems of the Palladium-Hydrogen System

An initiative by J. S. Cantrell and D. S. Sullinger produced a successful symposium on Metal-Hydrogen Systems as part of the American Chemical Society Central Section Meeting, held in Dayton, Ohio, from 10th to 11th June 1996. In a sub-section of the programme, of 26 presentations, particular focus was on recent progress in hydride battery developments, and over one-third of the contributions involved hydrogen systems of palladium and palladium alloys.

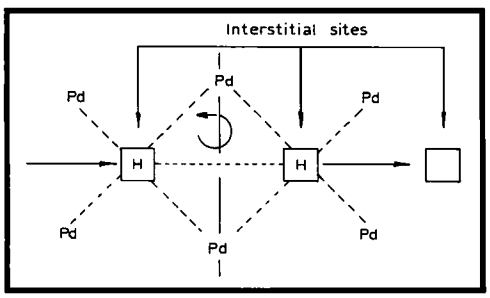
Three contributions from D. K. Ross and colleagues of the University of Salford, U.K., dealt with theoretical assessments of neutron scattering measurements for palladium and its alloys, and involved discussions of trapping processes of both protium and deuterium at dislocations, and of behavioural effects of positive muons. The effects of structural defects, due to hydride phase formations and decompositions, on the tensile properties of palladium-manganese alloys were considered in a poster by A. P. Croft, Lafayette College, Easton, U.S.A.

Solutions to detailed problems involved in the desorptive removal of various impurities from palladium powders were reported by G. L. Powell, Lockheed-Martin Energy System, Oak Ridge, Tennessee and B. E. Mills, Sandia Laboratories, Livermore, California, while the involvement of thin films of palladium and palladium alloys in hydride battery developments was discussed by Y.-T. Cheng and Y. Li, General Motors Research Center, Warren, Michigan.

Various crystallographic problems associated with structural disorders produced on introducing high levels of protium, deuterium and tritium into palladium, were reported by J. S. Cantrell and T. A. Breiter of Miami University, Oxford, Ohio. Two contributions from F. A. Lewis, Queen's University, Belfast, in collaboration with R. V. Bucur, University of Uppsala, Sweden, K. Kandasamy, University of Jaffna, Sri Lanka, X. Q. Tong, Southampton University and Y. Sakamoto, University of Nagasaki, Japan, dealt with sequences of structural hydride changes related to pressure-composition-temperature relationships of the Pd-H and Pd-Pt-H systems. An associated review was presented of lattice expansion strain gradients in these systems responsible for Uphill Effects observed in hydrogen diffusion processes. F.A.L.

The 50 K Anomaly of the Palladium-Hydrogen System

Various explanations have been advanced to identify the origin of the 50 K anomalies of the palladium-hydrogen system, that broadly characterise discontinuous regions near 50 K in plots of the temperature dependence of various experimental parameters, including the original observation of irregularities in specific heat plots (1). There is broad acceptance of proposed correlations between the 50 K anomalies and low temperature phase modifications and associated phase diagram alterations of the palladium-hydrogen system. However, there have been puzzling absences of accompanying production of dislocation networks.



An earlier qualitative correlation of specific heat changes with ortho/para hydrogen gas interconversion equilibria gained little encouragement from findings of dissociated lattice hydrogen entities located in interstitial sites in the f.c.c. palladium lattice. However, by analogy with interpretations of transient bonding states in the reaction (2):

$$H + HI \rightarrow H_2 + I$$

it is now suggested (1), that diffusing hydrogen atoms may be involved as specific-heat-contributing transient pairs during hydrogen diffusional transfers from occupied to vacant octahedral interstitial sites, as shown in the Scheme.

References

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2 D. A. V. Kliner, K.-D. Rinnen and R. N. Zare, *J. Chem. Phys.*, 1989, **90**, (8), 4625