with hydrogen, deuterium and tritium dissolved in palladium-silver alloys. The effects of hydrogen in palladium on Hall coefficients and thermoelectric power was also covered. In addition the behaviour of hydrogen in thin film and single crystal palladium was reported.

The Future

This survey reports briefly on only some of the platiniferous papers presented at the Stuttgart conference. The amount of work reported demonstrates continued interest in the interaction of platinum group metals with hydrogen, from both a fundamental and an applied viewpoint. The full conference proceedings will be published early in 1989 in the journal *Zeitschrift für Physikalische Chemie Neue Folge.*

The continuation of the I.S.M.H.S. conference series is to be held in the first week of September 1990 at Banff, Alberta, Canada. For details contact Professor F. D. Manchester, Department of Physics, University of Toronto, Canada. In the interim, a Gordon Conference on metal-hydrides is to be held 10th to 14th July 1989 at Tilton School, New Hampshire, U.S.A. A programme description, contact address and application details for this conference will appear in the March 1989 issue of the publication, *Science.* M.L.D.

A Durable Catalyst for Sealed Gas Lasers

Carbon dioxide transversely excited atmospheric pressure (TEA) lasers emit ultra-short pulses of infrared radiation in narrow, nearly parallel beams. The optical gain occurs in a pulsed, uniform electric discharge in a mixture of carbon dioxide, nitrogen and helium. To achieve maximum peak power output per unit discharge volume, a high concentration of carbon dioxide is required. In sealed operation, however, the carbon dioxide dissociates into carbon monoxide and oxygen, and even low concentrations of the latter cause the discharge to degenerate into localised arcs. Therefore it is necessary to ensure that the carbon monoxide and oxygen are recombined just as rapidly as the carbon dioxide is produced.

When the prolonged operation of a sealed carbon dioxide laser was first reported some ten years ago a thin platinum wire heated to a temperature of 1100°C was used to catalyse the recombination of the carbon monoxide and the oxygen. However, for some applications a hot platinum wire was too fragile, consumed too much power and created a cooling problem.

The need for lasers with much higher pulse repetition frequencies further increased the requirement for a catalyst with substantially greater activity at ambient temperature, and the use of finely dispersed platinum group metals supported on porous stannic oxide was reported to be capable of continuously recombining the carbon monoxide and oxygen generated in sealed carbon dioxide TEA lasers (1).

Now a communication from the Royal Signals and Radar Establishment reports the first use of a platinum/Fecralloy catalyst in a long-lived sealed carbon dioxide TEA laser (2). Fecralloy steel is the Registered Trade Mark of the U.K. Atomic Energy Authority for a specific range of alloys developed at Harwell, and its use as a support for platinum group metals catalysts developed for automotive emission control and catalytic combustion has been described here previously (3). This metallic support is a ferritic steel containing chromium, aluminium and yttrium which can be heat treated to form an alumina-rich surface layer to which the platinum metals can be applied, using a proprietary technique.

As oxygen is the main cause of arcing in sealed carbon dioxide TEA lasers, if a laser is to achieve a prolonged life it is necessary to remove any oxygen at the same rate as it is produced by dissociation. Now platinum/Fecralloy has been shown to be an active catalyst for carbon monoxide oxidation. In the basic laser gas mixture, at a total pressure of one atmosphere, the removal rates of oxygen and carbon monoxide increase, up to a point, with the power input to the catalyst. For a given power input, platinum/Fecralloy recombines these two gases five times faster than a hot platinum wire does. The durability of the former is an additional advantage for use in compact, sealed carbon dioxide TEA lasers.

References

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