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Platinum Metals Involvement in the Hydrogen Economy

International interest towards developments in various academic and technological aspects of the hydrogen economy is actively continuing and was demonstrated recently at the second conference in the Hydrogen Power Series, HYPOTHESIS-II, held from 18th to 22nd August 1997 at Agder College, Grimstad, Norway. This conference fills the intermediate years between the World Hydrogen Energy Conferences and has the same objectives. Almost 200 participants enjoyed excellent facilities and a combined lecture and poster display programme approaching 100 contributions.

Contributed papers were programmed under the subdivisions: Production, Utilisation, Distribution, Transportation and Safety, with the latter topic including some analysis of liquid hydrogen technology. Platinum metals involvement in areas of electrolytic hydrogen methodology and fuel cell technology were included in a substantial paper presented by M. M. Jaksic and N. V. Krstajic of the University of Belgrade, which dealt comprehensively with alternative catalyst compositions including both alloys and intermetallic compositions of platinum and palladium.

The advantageous inclusion of platinum in a catalytic packing composition involved in studies of the H_2-O_2 recombination reaction at low temperature was reported by G. Ioneta and I. Stefanescu of the Institute of Cryogenics and Isotope Separation, Rm. Valcea, Romania.

Incorporation of platinum into the anodes of fuel cells developed for improved resistance to carbon monoxide inhibition were reported by F. Lufrano, E. Passalacqua, G. Squadrito and A. Patti, C.N.R. Institute for Storage of Energy, S. Lucia-Messina, Italy, and the inclusion of platinum in fuel cells for vehicular transport was discussed by V. Kazarinov, F. Pekhota, V. Rusanov and V. Fateev of the Hydrogen Energy and Technology Council on Fuel Cells, Moscow. Needs for conjoint considerations of hydrogen concentration and lattice expansion strain gradients on processes of hydrogen permeation and on estimations of hydrogen diffusion coefficients in palladium and palladium alloys were summarised by F. A. Lewis, Queen's University, Belfast, R. V. Bucur, University of Uppsala, X. Q. Tong, University of Southampton, Y. Sakamoto, University of Nagasaki, and K. Kandasamy, University of Jaffna.

Selected papers will be published as a Proceedings Volume of HYPOTHESIS-II by Kluwer Press, Dordrecht. The next conference, HYPOTHESIS-III, will be held from July 5th to 8th, 1999, in Saint Petersburg State University, Russia; Fax: +7(812)428-7189, E-mail: egorov@efa.apmath.spb.su.

F. A. LEWIS

Palladium/Porous Glass Catalysts for Heck Reactions

Palladium catalysts are often used for the activation of C-H bonds, and in particular, there has been much work on palladium-catalysed Heck reactions. However, commercial development has so far been hampered by the low turnover numbers and turnover frequencies obtained. Palladium catalysts are also susceptible to poisoning, and therefore, relatively large amounts (1–5 mol%) of metal are required.

In order to overcome these problems, researchers from the CSIRO Division of Molecular Sciences, Australia, have used ~ 0.18 per cent palladium metal on porous glass tubing as a catalyst for liquid phase organic coupling reactions (J. Li, A. W.-H. Mau and C. R. Strauss, *Chem. Commun.*, 1997, (14), 1275–1276).

This catalyst, which could be used in continuous or batchwise reactions, is resistant to oxidative deterioration and can be reused several times; in most cases, the reactions can be performed in air.

The regioselectivity observed is mostly consistent with previously reported Heck reactions with terminal alkenes yielding about 80:20 mixtures of 1- and 2-arylated alkenes. This catalyst also gave good yields for the coupling of terminal acetylenes with aryl iodides and bromides to give internal alkynes without the need for solubilising or activating ligands.

It is suggested that this system could find uses in other palladium catalysed reactions, such as hydrogenations and dehydrogenations.