

# ABSTRACTS

of current literature on the platinum metals and their alloys

## PROPERTIES

### Grazing Incidence Reflection Coefficients of Rhodium, Osmium, Platinum, and Gold from 50 to 300Å

M. C. HETRICK, S. A. FLINT and J. EDELSTEIN, *Appl. Opt.*, 1985, **24**, (22), 3682-3685

Reflectance measurements for Rh, Os, Pt and Au at multiple grazing angles of illumination at 14 wavelengths between 46.5 and 283Å have been performed. All reflective coats were deposited by electron beam evaporation onto a glass substrate which was at room temperature, at a deposition rate from ~5Å/s for Os, Rh and Pt to 215Å/s for Au. The coatings were 125Å thick. Rh has the highest overall reflectance, followed by Os, Au and Pt. As graze angle increases these differences increase. At 16° Rh out reflects Au by a factor of 1.3 on average. Reflectance values against  $\lambda$  were plotted. The reflectance of Os and Rh decreased with time.

### Oxygen Interaction with Pt-Pd-Rh Catalytic Alloys

M. RUBEL and M. PSZONICKA, *J. Mater. Sci.*, 1986, **21**, (1), 241-245

The interaction between O<sub>2</sub> and alloy gauzes made of 92.5Pt-4Pd-3.5Rh and 81Pt-15Pd-3.5Rh-0.5Ru (wt.%) was studied at 1163-1373K and an O<sub>2</sub> pressure of 0.094MPa. Volatile oxides  $\alpha$ -PtO<sub>2</sub>, RhO<sub>2</sub> and PdO formed and the surface topography and chemical composition changed. The oxide formation rate decreased with increasing Pd concentration. The distribution of elements on the oxidised surfaces are non-uniform, grain facets are enriched with Pt and grain boundaries with Rh and O, probably as Rh<sub>2</sub>O<sub>3</sub>.

### Structural Relaxation Behaviour and Mechanical Properties of Warm-Drawn Fe<sub>75</sub>Si<sub>10</sub>B<sub>15</sub> and Pd<sub>75</sub>Ni<sub>8.5</sub>Si<sub>16.5</sub> Amorphous Wires

A. INOUE, N. YANO, H. S. CHEN, M. HAGIWARA and T. MASUMOTO, *Mater. Sci. Eng.*, 1986, **77**, 45-57

Warm drawn Pd<sub>75</sub>Ni<sub>8.5</sub>Si<sub>16.5</sub> and Fe<sub>75</sub>Si<sub>10</sub>B<sub>15</sub> amorphous wires were examined to determine the effect of warm working on amorphous alloys. The Pd alloy could be drawn to ~40% reduction in area without fracture at a drawing velocity of 0.25m/s at room temperature to 650K, and for the Fe alloy at room temperature to 825K. Young's modulus increased monotonically with increasing drawing temperature for both alloys. Warm drawn wires had a higher stability against structural relaxation, higher Young's modulus and a higher proportional limit than cold drawn wires. Warm drawn wires also had a higher tensile fracture strength than cold drawn wires.

### Evidence for Amphoteric Behavior of Ru on CdTe Surfaces

D. N. BOSE, S. BASU, K. C. MANDAL and D. MAZUMDAR, *Appl. Phys. Lett.*, 1986, **48**, (7), 472-474

Modification of large grain p-CdTe by Ru reduces the sub-band-gap response and increases the minority carrier diffusion length from 0.67 to 0.92  $\mu$ m. Contact potential difference measurements on n- and p-CdTe show shifts in the surface Fermi level in opposite directions, corresponding to increases in barrier height in each case. The decrease in photocurrent density after modification was only 4.7% in 130 hours, compared with a decrease of 89% over 130 hours prior to modification.

### Ruthenium in Glass-Forming Borosilicate Melts

H. D. SCHREIBER, F. A. SETTLE, P. L. JAMISON, J. P. ECKENRODE and G. W. HEADLEY, *J. Less-Common Met.*, 1986, **115**, (1), 145-154

Ru was added to a borosilicate melt system, as a reference model of the glass to be used in nuclear waste immobilisation and the amount dissolved was investigated as a function of the Ru dopant, amount of Ru dopant, redox additives, time, melt atmosphere and melt temperature. The amount of Ru dissolved was <0.001 wt.% in all cases.

## CHEMICAL COMPOUNDS

### Homonuclear Cluster Compounds of Platinum

D. M. P. MINGOS and R. W. M. WARDLE, *Transition Met. Chem.*, 1985, **10**, (12), 441-459

A review of Pt cluster compounds is presented which makes generalisations concerning the way in which the structures of cluster compounds evolve from simple metal-metal bonded species into aggregates which begin to resemble the bulk metal. The syntheses of homonuclear Pt cluster compounds, their characterisation and structures are discussed. (76 Refs.)

### A New Superoxo-Complex of Palladium that Oxidizes Alkenes to Epoxides

E. P. TALSI, V. P. BABENKO, V. A. LIKHOLOBOV, V. M. NEKIPELOV and V. D. CHINAKOV, *J. Chem. Soc., Chem. Commun.*, 1985, (24), 1768-1769

A new Pd superoxo complex AcOPdO<sub>2</sub> which can oxidise linear alkenes such as ethylene and propene to epoxides has been synthesised. The rate of formation of oxiranes during ethylene oxidation by the superoxo complex is ~10<sup>3</sup> times greater than the rate of oxidation by peroxy acids.

## ELECTROCHEMISTRY

### A Platinized Titanium Anode for Chromium Electroplating

F. HINE, K. TAKAYASU and N. KOYANAGI, *J. Electrochem. Soc.*, 1986, **133**, (2), 346-350

A new anode of platinized Ti sheet, loaded with IrO<sub>2</sub> catalyst, a catalyst-free Pt-Ti sheet, a plain Pt sheet and various Pb alloy sheets were tested for Cr electroplating in Sargent baths and fluosilicate baths. With a Pt anode the Cr<sup>3+</sup> concentration greatly increased with time in the Sargent bath. The Pt-Ti anode loaded with IrO<sub>2</sub> enables O<sub>2</sub> bubbles to be quickly removed, thus stimulating mass transfer and oxidation by IrO<sub>2</sub> of chromic ions at the surface. Uniform current distribution along the surface is anticipated. This anode was resistant to corrosion.

### Electrochemical Studies on the Palladium-Hydrogen System. I. Exchange Current and Potential Measurements. II. Applicability of Resistance Strain Gauges for Determining Hydrogen Concentration Changes in Metals

H.-G. SCHÖNEICH, U. BILITEWSKI and H. ZÜCHNER, *Z. Phys. Chem. (Frankfurt am Main)*, 1985, **143**, 97-106; 107-110

Annealed, deformed and quenched Pd foils loaded with different amounts of H up to 1000 at.ppm were investigated electrochemically. A linear relationship was observed between the log of the exchange current and the electrode potential. A corresponding linear relationship between the logs of the exchange current and H concentration can be obtained by considering the interaction of H with lattice imperfections. A two level trap model has been applied to the results. Resistance strain gauges were tested for determining the H concentration in the  $\alpha$ -phase of the Pd-H system, in combination with electrochemical measurements. The strain gauge together with time-lag diffusion measurements can "show" H before it arrives at the surface of the detection side. This method can be used to measure H concentration and concentration changes within the bulk, independent of surface specific effects.

### An Examination of the Palladium/Palladium Oxide System and Its Utility for pH-Sensing Electrodes

E. KINOSHITA, F. INGMAN and G. EDWALL, *Electrochim. Acta*, 1986, **31**, (1), 29-39

Single crystal and polycrystalline Pd was used for the electrochemical examination of the Pd-PdO system in aqueous solutions. A thermal method of oxidation at high temperature and an electrochemical method were used to prepare the electrodes. The properties of electrodes prepared thermally depend on the temperature of the oxidation and show an almost theoretical slope in the pH range 2.5-8.

### Stability and Response Studies of Multicolor Electrochromic Polymer Modified Electrodes Prepared from Tris (5,5'-Dicarboxyester-2,2'-Bipyridine)Ruthenium(II)

C. M. ELLIOTT and J. G. REDEPENNING, *J. Electroanal. Chem. Interfacial Electrochem.*, 1986, **197**, (1 and 2), 219-232

The p-toluene sulphonate salt of complex tris(5,5'-dicarbo(3-acrylatoprop-1-oxy)-2,2'-bipyridine)Ru(II) was spin coated onto optically transparent SnO<sub>2</sub> and thermally polymerised to yield a polymer modified electrode with 7 coloured states. The polymer shows rapid electrochemical response (~250ms for total conversion through 7 oxidation states).

## PHOTOCONVERSION

### Platinized Chloroplasts: A Novel Photocatalytic Material

E. GREENBAUM, *Science*, 1985, **230**, (4732), 1373-1375

Colloidal Pt was prepared and precipitated directly onto photosynthetic thylakoid membranes from aqueous solution and entrapped on fibre glass filter paper. This composition gave sustained simultaneous photoevolution of H<sub>2</sub> and O<sub>2</sub> when irradiated at any wavelength in the chlorophyll absorption spectrum. Photoactivity was dependent upon the value of the ionic species from which the Pt was precipitated.

### Energy-Storing Photocatalysis of Transition Metal Complexes with High Quantum Efficiency

T. YAMAKAWA, H. MIYAKE, H. MORIYAMA, S. SHINODA and Y. SAITO, *J. Chem. Soc., Chem. Commun.*, 1986, (4), 326-327

Sn(II) co-ordinated Ir, Rh, Pt and Ru complex catalysts were examined photocatalytically for the homogeneous liquid-phase dehydrogenation of propan-2-ol. Photoenhancement was observed for all the complexes and the photoenhanced catalytic activity responded rapidly to the photoirradiation being switched on or off. The Sn-Ir catalyst exhibited the highest photoreactivity ever reported for this energy storing reaction.

### A Novel Photocatalytic Process of Amine N-Alkylation by Platinized Semiconductor Particles Suspended in Alcohols

B. OHTANI, H. OSAKI, S.-I. NISHIMOTO and T. KAGIYA, *J. Am. Chem. Soc.*, 1986, **108**, (2), 308-310

The photocatalytic preparation of unsymmetrical secondary and tertiary amines by Pt/TiO<sub>2</sub> suspended in a variety of alcohols as solvents is described. The alcohols were potent N-alkylation reagents and the N-alkylation proceeds efficiently at room temperature. For irradiation >300nm, the amines formed.

### The Synergism of $\beta$ -Rays and Photons on Photoassisted Catalytic Decomposition of Water by Pt/TiO<sub>2</sub>

K. WATANABE, K. ICHIMURA and N. INOUE, *Chem. Phys. Lett.*, 1986, **124**, (2), 196-198

The H<sub>2</sub> evolution rate in photoassisted decomposition of water by Pt/TiO<sub>2</sub> was significantly enhanced in the presence of tritium (90-180Ci/ml). The extent of the enhancement was proportional to the T concentration. The effect is attributed to the synergism of  $\beta$ -rays from T and photons on the decomposition.

### Heterogeneous Photo-Catalysis: Enhanced H<sub>2</sub> Production in TiO<sub>2</sub> Dispersions under Irradiation. The Effect of Mg Promoter at the Semiconductor Interface

J. KIWI and M. GRÄTZEL, *J. Phys. Chem.*, 1986, **90**, (4), 637-640

Promoter action in semiconductors was studied using Mg<sup>2+</sup> doping of TiO<sub>2</sub> powders as a model system. A novel series of catalysts of Pt-Mg<sup>2+</sup>-TiO<sub>2</sub> were studied, of which the most efficient was 0.05%Pt-1%Mg<sup>2+</sup>-TiO<sub>2</sub> with a 0.26% efficiency in light energy conversion. The catalytic properties of these novel catalysts were determined for their efficiency in water-splitting under u.v. irradiation. The most efficient catalysts are up to 4 times more active than catalysts without Mg<sup>2+</sup>.

### A New Optical Photochemical Memory Device in a Light-Sensitive Chemical Active Medium

L. KUHNERT, *Nature*, 1986, **319**, (6052), 393-394

On using Ru(bpy)<sub>3</sub><sup>2+</sup> as the catalyst in the Belousov-Zhabotinsky reaction a light-sensitive chemically active medium was obtained which could be used to manipulate the character of wave phenomena photochemically. The Belousov-Zhabotinsky reaction employs various bromide ions, and adding Ru(bpy)<sub>3</sub><sup>2+</sup> alters the rate of bromide production by photochemical action. Several colour changes were produced. The system can store time-impressed optical information and can process this information in some oscillating cycles as a dynamically working memory device.

### The Ruthenium(II)-Tris-(1,4,5,8-Tetraazaphenanthrene) Dication: A New Photocatalyst in Redox Cycles for Hydrogen Production

A. KIRSCH-DE MESMAEKER, D. MAETENS and R. NASIELSKI-HINKENS, *Acta Chim. Hung.*, 1985, **119**, (2-3), 245-247

The Ru title complex has been tested as a photocatalyst for production of MV<sup>+</sup> in the presence of a sacrificial agent. The excited state of the complex is reductively quenched by irreversibly oxidised reducing agents (sacrificial agents). The thus produced reduced complex can reduce MV<sup>2+</sup> with a quantum yield better than with Ru(bpy)<sub>3</sub><sup>2+</sup>.

### Catalysis and Photoelectrochemistry on Ruthenium Disulphide Surfaces

A. J. McEVOY, *Mater. Chem. Phys.*, 1986, **14**, (2), 113-121

A review of the catalytic and photochemical behaviour of RuS<sub>2</sub> is presented. The physical properties, preparation and electrochemistry of sintered polycrystalline and single crystal RuS<sub>2</sub> electrodes is examined. Photochemical catalyses by RuS<sub>2</sub>, desulphurisation and hydroprocessing reactions are discussed. (35 Refs.)

### Hydrogen Production from the Splitting of H<sub>2</sub>S by Visible Light Irradiation of Vanadium Sulfides Dispersion Loaded with RuO<sub>2</sub>

S. A. NAMAN, S. M. ALIWI and K. AL-EMARA, *Int. J. Hydrogen Energy*, 1986, **11**, (1), 33-38

The use of aqueous VS dispersions loaded with RuO<sub>2</sub> for cleavage of H<sub>2</sub>S was studied under visible light illumination at 35°C and room temperature, and at different pH and different concentrations of Na<sub>2</sub>S, Na<sub>2</sub>SO<sub>3</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solutions. The photogeneration of H<sub>2</sub> from the splitting of H<sub>2</sub>S was very efficient when 0.1MNa<sub>2</sub>S or Na<sub>2</sub>SO<sub>3</sub> at pH=11 was used in aqueous media at 35°C, with 0.3g of VS and 0.9 mg RuO<sub>2</sub> dissolved in 300 ml H<sub>2</sub>O; and thiosulphate was formed as a replacement of particles.

## LABORATORY APPARATUS AND TECHNIQUE

### A Platinum Evaporation Source for Molecular Beam Epitaxy Applications

L. RAMBERG, E. FLEMING and T. G. ANDERSSON, *J. Vac. Sci. Technol.*, 1986, **4**, (1), 141-142

An ~4mm diameter piece of high purity Pt has been evaporated under UHV conditions for use in molecular beam epitaxy. The Pt temperature at a deposition rate of 130Å/h, corresponding to a beam flux of 2 × 10<sup>13</sup> atoms/cm<sup>2</sup>s, is ~2200K. The apparatus can be used in situ for studying the interaction of Pt with GaAs surfaces which would be restricted using a commercial electron beam evaporator.

### Application of Platinum Gauze Activated by Hydrogen to the Adsorption Separation of Silver Traces and Their Determination by AAS or Spectrophotometry

Z. BOGUSZEWSKA, M. KRASIEJKO and B. PALMOWSKA-KUŚ, *Talanta*, 1986, **33**, (2), 115-160

A method has been developed for the separation of Ag from Cu by its deposition through internal electrolysis with H adsorbed on a Pt surface. The Ag can then be stripped and measurements taken. The activation of the Pt surface with adsorbed H can be achieved either electrolytically or by passing H<sub>2</sub> through the solution in which the Pt is immersed.

### Determination of Uranium and/or Plutonium Using X-Ray Fluorescence Analysis Excited by $^{192}\text{Ir}$ Sealed Sources

P. MARTINELLI, J. L. BOUTAINE, G. GOUSSEAU, J. C. TANGUY and C. TELLUCHEA, *Nucl. Instrum. Methods Phys. Res.*, 1986, **A242**, (3), 569-573

An  $^{192}\text{Ir}$  analyser was used to measure the U/Pu contents in nitric solutions and for Pu content determinations in  $\text{UO}_2/\text{PuO}_2$  fuel pellets. The use of a semiconductor detector, online microcomputer and high speed analyser allow sensitivities of 20mg/1U for low concentration solutions or 50ppm for ore containing  $<2000\text{ppm}$  and 1% for high concentrations.

### Biosensors Based on Ammonia Sensitive Metal-Oxide-Semiconductor Structures

F. WINQUIST, A. SPETZ, M. ARMGARTH, I. LUNDSTRÖM and B. DANIELSSON, *Sens. Actuators*, 1985, **8**, (2), 91-100

The physical principles of  $\text{NH}_3$  gas sensitive thin Ir or Pt metal-oxide-semiconductor structures are described. Thin Ir layers have been found to work better than thin Pt layers in biosensing applications when the devices are operated at low temperatures and in an ambient containing water vapour.

## JOINING

### Determination of the Parameters of the Diffusion Zone in Solid-Phase Bonding Platinum to Titanium

E. A. DZHUR et al, *Weld. Prod.*, 1985, **32**, (5), 41-42

The characteristics of the diffusion zone formed when bonding Pt foil to a thick Ti substrate were examined by X-ray microanalysis, and a diffusion zone position diagram was constructed. An intermetallic layer in the zone of physical contact can indicate the position of the contact surface. At bond temperature 1138K, pressure 6.37MPa and bonding times of 900, 1800 and 2700s, the diffusion zone starts in the Pt foil and the zone then spreads into Ti. In a diffusion zone of 35 $\mu\text{m}$  total width, formed during 2700s bonding time, 16.6 $\mu\text{m}$  of the zone is in Pt and 19 $\mu\text{m}$  is in Ti.

## HETEROGENEOUS CATALYSIS

### Direct Conversion of Methane to Methanol, Chloromethane and Dichloromethane at Room Temperature

K. OGURA and K. TAKAMAGARI, *Nature*, 1986, **319**, (6051), 308

$\text{CH}_4$  has been directly converted to methanol, chloromethane and dichloromethane on illumination at room temperature. There are three steps to the conversion which used a two-compartment glass electrolysis cell with an anode of 6 $\text{cm}^2$  Pt plate partly immersed in the anolyte, with  $\text{CH}_4$  above. Only the Pt surface exposed to  $\text{CH}_4$  was illuminated.

### HCN Synthesis from $\text{NH}_3$ and $\text{CH}_4$ on Pt at Atmospheric Pressure

M. P. SUÁREZ and D. G. LÖFFLER, *J. Catal.*, 1986, **97**, (1), 240-242

The reaction rates for the synthesis of HCN acid at atmospheric pressure on Pt wires was examined. The Pt was pretreated in air at 1300K for ~0.5h to remove C contaminants. Reaction rates for HCN concentration vs. time were calculated and the data were fitted with an expression. The synthesis of HCN was concluded to be a relatively fast reaction probably controlled by surface diffusion or surface reaction. The reaction rate is strongly affected by the composition of the reactant.

### Selective Monohalogenation of Methane over Supported Acid or Platinum Metal Catalysts and Hydrolysis of Methyl Halides over $\gamma$ -Alumina-Supported Metal Oxide/Hydroxide Catalysts. A Feasible Path for the Oxidative Conversion of Methane into Methyl Alcohol/Dimethyl Ether

G. A. OLAH, B. GUPTA, M. FARINA, J. D. FELBERG, W. M. IP, A. HUSAIN, R. KARPELES, K. LAMMERTSMA, A. K. MELHOTRA and N. J. TRIVEDI, *J. Am. Chem. Soc.*, 1985, **107**, (24), 7097-7105

The catalytic chlorination and bromination of  $\text{CH}_4$  was achieved over  $\text{Pt}/\text{Al}_2\text{O}_3$ ,  $\text{Pd}/\text{BaSO}_4$  and supported solid acid catalysts (such as  $\text{FeO}_x\text{Cl}_y/\text{Al}_2\text{O}_3$ ) at 180-250°C with gaseous hourly space velocity of 50-1400ml/g/h giving 8-58% conversions, with selectivity in  $\text{CH}_3\text{Cl}(\text{CH}_3\text{Br}) > 90\%$ . This method enables ethylene and homogeneous lower olefins and/or higher hydrocarbons to be prepared.

### Reaction Kinetics on a Commercial Three-Way Catalyst: The $\text{CO}-\text{NO}-\text{O}_2-\text{H}_2\text{O}$ System

B. SUBRAMANIAM and A. VARMA, *Ind. Eng. Chem., Prod. Res. Dev.*, 1985, **24**, (4), 512-516

Kinetic data for the  $\text{CO}-\text{NO}-\text{O}_2-\text{H}_2\text{O}$  system were obtained on a commercial three-way Pt-Rh/ $\gamma$ - $\text{Al}_2\text{O}_3$  catalyst during experimental conditions relevant to automotive exhaust catalysts. A parallel series of reactions  $\text{CO} + \text{O}_2 \rightarrow \text{CO}_2(k_1)$ ,  $\text{CO} + \text{NO} \rightarrow \text{CO}_2 + \text{N}_2(k_2)$  and  $\text{CO} + \text{NO} + \text{H}_2\text{O} \rightarrow \text{NH}_3 + \text{CO}_2(k_3)$  with  $k_1 \gg k_2$  and  $k_3$  was found over the range of conditions studied. The reactions enabled optimised kinetic parameters which predict the reaction rate, when given the bulk gas composition and temperature, to be evaluated.

### Effect of Promoting $\text{Rh}/\text{SiO}_2$ with $\text{TiO}_2$ on the Reduction of Nitric Oxide

N. K. PANDE and A. T. BELL, *Appl. Catal.*, 1986, **20**, (1-2), 109-122

Adding  $\text{TiO}_2$  as a promoter to a  $\text{Rh}/\text{SiO}_2$  catalyst for NO reduction by  $\text{H}_2$  or CO enhances the activity, giving an activity and rate similar to  $\text{Rh}/\text{TiO}_2$ .

## Methane Synthesis in the H<sub>2</sub>O-CO Reaction over Titania Supported Rh and Rh-Pt Catalysts

I. TOMBÁČZ, A. ERDŐHELYI and F. SOLYMOŠI, *Magy. Kem. Foly.*, 1985, **91**, (11), 525-527

Rh/TiO<sub>2</sub> was found to be a very active catalyst for CH<sub>4</sub> formation in the H<sub>2</sub>O+CO reaction and its catalytic activity was increased by a factor of 5 in the presence of Pt.

## Promoting Role of Fe in Enhancing Activity and Selectivity of MeOH Production from CO and H<sub>2</sub> Catalysed by SiO<sub>2</sub>-Supported Ir

T. FUKUSHIMA, Y. ISHII, Y. ONDA and M. ICHIKAWA, *J. Chem. Soc., Chem. Commun.*, 1985, (24), 1752-1754

Addition of Fe to Ir/SiO<sub>2</sub> catalysts used in CO hydrogenation improves the yield of and selectivity towards MeOH with 90% C efficiency, owing to suppression of methanation.

## Syngas Reactions. IX. Acetic Acid from Synthesis Gas

J. F. KNIFTON, *J. Catal.*, 1985, **96**, (2), 439-453

Acetic acid has been generated directly from syngas with up to 95wt.% selectivity and 97% C efficiency, using a Ru-Co-Ir/Bu<sub>4</sub>PBr melt catalyst combination. C<sub>1</sub>-oxygenate formation is only observed in the presence of Ru carbonyls. Controlled quantities of iodide ensure that initially formed MeOH is rapidly converted to the more reactive CH<sub>3</sub>I, after which Co-catalysed carbonylation to acetic acid occurs.

## HOMOGENEOUS CATALYSIS

### Tris(triphenylphosphine)rhodium(I) Chloride Catalyzed Synthesis of Methyl Formate from Methanol, Carbon Dioxide and Hydrogen in the Presence of a Tertiary Amine

H. PHALA, K. KUDO, S. MORI and N. SUGITA, *Bull. Inst. Chem. Res., Kyoto Univ.*, 1985, **63**, (2), 63-71

The highest yields of methyl and ethyl formates ever reported have been obtained from methyl and ethyl alcohols, CO and H<sub>2</sub> in the presence of RhCl(PPh<sub>3</sub>)<sub>3</sub> catalysts and a base triethylenediamine at a temperature of ~100°C. The turnover number, with respect to Rh, was >120 for the reactor after 5 hours.

### Heteropoly Anion-Assisted Rh Catalysis Revealed in the Homogeneous Selective Hydrogenation

K. URABE, Y. TANAKA and Y. IZUMI, *Chem. Lett. Jpn.*, 1985, (10), 1595-1596

When coupled with Li salts of heteropoly acids the Wilkinson complex RhCl(PPh<sub>3</sub>)<sub>3</sub> catalyst became very active and selective for the hydrogenations of alkyne to alkene, and substituted alkenes.

## FUEL CELLS

### Preparation and Characterization of Platinized-Carbon Hydrogen Anodes for Alkali and Acid Fuel Cells

A. K. SHUKLA, K. V. RAMESH, R. MANOHARAN, P. R. SARODE and S. VASUDEVAN, *Ber. Bunsenges Phys. Chem.*, 1985, **89**, (12), 1261-1267

Highly dispersed platinised-C H<sub>2</sub> anodes for use in alkali and acidic media H<sub>2</sub>/air fuel cells and Ni/H batteries are manufactured, discussed and characterised. Optimised H anodes can withstand currents up to 350, 800 and 500mA/cm<sup>2</sup> for extended periods in 6N KOH, 5N H<sub>2</sub>SO<sub>4</sub> and 20N H<sub>3</sub>PO<sub>4</sub> electrolytes.

### Transmission Electron Microscopic Examination of Phosphoric Acid Fuel Cell Components

A. PEBLER, *J. Electrochem. Soc.*, 1986, **133**, (1), 9-17

TEM was used to characterise tested and untested phosphoric acid fuel cell components, including Pt/C, the C backing paper and bonded catalysts.

## CHEMICAL TECHNOLOGY

### Optimizing Nitric Acid Plant Platinum Recovery Gauze Systems

W. L. STAMPE, *Nitrogen*, 1986, (159), 28-32

The optimisation of parameters needed for Pt and Rh recovery from nitric acid manufacturing plants using NH<sub>3</sub> oxidation on Pt-Rh gauzes is discussed. Optimised criteria include the shape of the gauzes, NH<sub>3</sub> feed rates, pressure drops, operating temperatures, and production rates. The platinum recovery gauze systems, based on Pd-Ni, and their utilisation and effect on the system are discussed. The savings from recovered noble metals are examined. An overall Pt recovery efficiency of ~85% is obtainable.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Non-Linear and Hysteresis Effects in the Current-Voltage Characteristics of Ti/WO<sub>3</sub>/Ir Thin Film Sandwiches

T. YOSHIMURA, M. WATANABE and K. HORI, *Thin Solid Films*, 1985, **130**, (1/2), 23-28

The I/V characteristics of Ti/WO<sub>3</sub>/Ir thin film sandwiches were studied. Clear evidence of rectification in the device was observed. I/V hysteresis was seen when the device was aged using a triangular wave of frequency 0.1Hz(±2.7V). The hysteresis followed a triangular wave of frequency 1kHz, indicating that it can be used for high speed switching of electrochromic displays. The hysteresis is attributed to stretching and shrinkage of the depletion layer which is induced by protons injected into the WO<sub>3</sub> film.