

Homogeneous Catalytic Hydrogenation of Carboxylic Acid Esters to Alcohols

R. A. GREY, G. P. PEZ, A. WALLO and J. CORSI, *J. Chem. Soc., Chem. Commun.*, 1980, (16), 783-784

The homogeneous catalytic hydrogenation of activated and simple aliphatic carboxylic acid esters to their corresponding primary alcohols has been accomplished under mild conditions, 90°C, 620 kPa of H₂, using a novel anionic Ru hydride complex.

ELECTRICAL AND ELECTRONIC ENGINEERING

Platinum-Induced Hysteresis and Non-volatile Memory Properties in MOS Systems (PLATMOS)

A. G. NASSIBIAN and L. FARAONE, *IEEE Trans. Electron Devices*, 1980, **BD-37**, (9), 1757-1761

Pt was diffused into MOS p-type Si <111> and <100> oriented structures of 3-5Ω cm resistivity and was studied by h.f. capacitance/voltage techniques. The Pt produced hysteresis in the MOS system which has not been previously observed. The hysteresis depends strongly on diffusion time and crystal orientation, being more pronounced in <111> wafers than <100>. This observation is associated with some bias-dependant charge storage at the oxide/Si interface or mobile Pt ions in the oxide. This hysteresis could be used as a memory element due to being nonvolatile.

NEW PATENTS

ELECTROCHEMISTRY

Platinum Coated Gas Turbine Igniters

JOHNSON MATTHEY & CO. LTD.

British Patent 1,572,339

Electrode erosion and/or corrosion is avoided when the electrode working surfaces of the ignitor are made from a host material in which Co, Ni and/or W predominates and is alloyed with one or more platinum group metals (except Os).

ELECTRODEPOSITION AND SURFACE COATINGS

Palladium Chemical Plating Bath

MINE SAFETY APPLIANCES CO.

British Appl. 2,040,316 A

A bath for the chemical (electroless) deposition of Pd contains a divalent Pd salt, NH₃ or an amine and a tertiary amine borane, optionally with an organic stabiliser. A hard Pd alloy film is obtained containing 1-3% each of amorphous B and PdH_{0.706}. The substrate is preferably Ni.

Shallow Silicide Contacts Formed by Using Codeposited Pt₂Si and Pt_{1.2}Si Films

M. EIZENBERG, H. FÖLL and K. N. TU, *Appl. Phys. Lett.*, 1980, **37**, (6), 547-549

Shallow silicide contacts were made on Si by using co-deposited Pt₂Si and Pt_{1.2}Si alloyed films. Cross-sectional TEM showed that a uniform contact 10 nm deep was achieved by both films. Current-voltage measurements showed that the Schottky barrier height of these shallow contacts was as good as that of PtSi made by reacting pure Pt with n-Si.

TEMPERATURE MEASUREMENT

Effect of Pt Oxidation of Pt Resistance Thermometry

R. J. BERRY, *Metrologia*, 1980, **16**, (3), 117-126

The effect of Pt oxidation on the electrical resistance for different Pt resistance thermometers was investigated. Oxidation caused large, undesirable resistance changes in spite of the low O₂ pressure inside them. Two Pt oxides were identified, both having temperature ranges for formation and dissociation within the official operating range of their thermometers on the IPTS. Rates of resistance changes due to oxidation depend strongly on the particular Pt sensor, operating temperature and Pt oxides initially present. For the 0°C resistance these rates can vary from 0 to 109mΩ/h.

Platinum Group Metal Thermal Barriers

JOHNSON MATTHEY & CO. LTD.

British Appl. 2,041,246 A

Coatings on Ni, Co or Fe-based superalloys, refractory alloys or refractory metals include a protective layer of one or more platinum group metal and a refractory metal oxide such as Al, Zn, Ti.

Activating Polymeric Substrates Prior to Electroless Plating

OXY METAL INDUSTRIES CORP. *U.S. Patent* 4,204,013

An accelerating solution containing substituted alkyl amine, is used on polymeric substrates activated with acidic Sn-Pd complexes to provide total metal coverage by subsequent electroless plating.

Platinum Plating

A. G. KOZLOV and N. A. NEROZIN

Russian Patent 732,412

For plating Ti, the bath preferably contains 15 g/l Pt as a Pt diaminodinitrite, 100 g/l NH₄NO₃, 10 g/l NaNO₂, NH₃ to pH 7.5, and the reaction is carried out at a current density of 5-12A/dm² and 70-80°C.

LABORATORY APPARATUS AND TECHNIQUE

Monitoring the Concentration of Heavy Metals in Waste Water

SIEMENS A.G.

British Patent 1,576,984

Water is caused to flow through an electrolytic cell where any heavy metals present are deposited onto a platinum group metal electrode. The water is periodically replaced with an electrolyte and the cell current reversed until complete dissolution of the heavy metals is obtained. The current used for the dissolution indicates the amount of heavy metals present in the waste water.

Detecting the Presence of Water in Oil

ALCO STANDARD CORP. *British Appl.* 2,042,737 A

A temperature sensitive resistor, for example a Pt wire wound on a ceramic former, immersed in oil carries a current controlled by a transistor to keep the transistor at a constant temperature above 100°C. Any H₂O in the oil will vaporise and cool the resistor, thus lowering its resistance and triggering an alarm system.

Leak Detector

MYLHURST LTD.

European Appl. 13,466

Pt electrode tips may be used in a device for detecting the leakage of a cryogenic liquid.

Hydrogen Separation

E. F. HILL

European Appl. 15,428

H₂ is separated from gas streams by diffusion through a heated membrane of a b.c.c. Ti-Zr alloy, the faces of which have been cleaned and Pd coated.

Oxygen Sensor Construction

NISSAN MOTOR CO. LTD.

U.S. Patent 4,207,159

A new form of sensor has a lanthanide-stabilised zirconia or other oxide electrolyte with a porous reference electrode of Au or Ag on one side and a platinum group metal (or alloy) catalytic electrode on the other.

HETEROGENEOUS CATALYSIS

Activation of Vitreous Material

B.F.G. GLASSGROUP

British Patent 1,574,055

H₂ fixation may be achieved on vitreous materials, without the use of organosilane coupling agents, if H₂ has been conditioned by hot contact with Pt or Pd or another catalytic metal prior to contact with the vitreous substrate.

Biological Material Conversion to Fuels

MOBIL OIL CORP.

British Appl. 2,039,943 A

Plant or animal substances with a suitable hydrocarbon ratio are converted to liquid fuels at an elevated temperature in the presence of a zeolite which may be ion exchanged with Pd, a lanthanide metal or another metal.

Process for Treating Ammonia Containing Waste Water

OSAKA GAS CO.

British Appl. 2,043,045 A

Waste water is subjected to wet oxidation, at a temperature between 100 and 370°C, in the presence of a catalyst, which may be supported Pt, Pd, Rh, Ir, Ru or Au.

Shell Boilers

JOHNSON MATTHEY & CO. LTD.

British Appl. 2,043,851 A

In shell boilers of specified design, at least a part of any unburned fuel leaving the combustion chamber undergoes catalytic combustion. The catalyst is preferably a ceramic or metal support coated with a layer of refractory metal oxide on which is deposited an active material selected from Pt, Pd, Rh, Ir and Ru, and alloys of these metals with each other and with one or more base metals.

Iridium and Rhodium Hydrogenation and Hydroformylation Catalysts

CONOCO INC.

U.S. Patent 4,198,353

Air stable, heterogeneous Rh and Ir trihalide polymer-bound catalysts have high levels of activity for the conversion of olefins to aldehydes and are easily recovered from the reaction mixture.

Heater for Poultices and Disposable Pocket Heaters

A. FUJIWARA

U.S. Patent 4,205,957

Known heaters use oxidisable metal powders, for example, of Fe, Zn, etc. The efficiency of the heating powders is now increased by adding Pt, Pd, Rh or Ag oxidation catalysts to the powders. The catalysts, preferably, have a water-repellant coating of fatty acid or metallic soap.

Platinum-Palladium-Manganese Oxide Ozone Decomposition Catalyst

MINNESOTA MINING & MANUFACTURING CO.

U.S. Patent 4,206,083

Co-precipitation of Pt, Pd and Mn oxide on a ceramic support gives an efficient catalyst for the decomposition of ozone, for example in airplane cabins.

Smoke Control for Diesels

JOHNSON MATTHEY & CO. LTD. *French Appl.* 2,430,787

Smoke-forming particles entrained in diesel or I.C.E. exhaust gases are oxidised in a catalyst unit where turbulence is created and the flow of gases directly through the unit is prevented. The catalyst is a platinum group metal or metals, an alloy or a mixture of these metals supported on ceramic, metallic wire or mesh, or corrugated metal sheet.

Platinum Metal Dealkylation Catalyst

INSTITUT FRANCAIS DU PETROLE

French Appl. 2,434,131

A catalyst for the steam dealkylation of toluene, for example, contains 0.1–2% of Ru, Rh, Pd and/or Os, 0.05–0.8% Re and 0.01–5% of Li, Na, K, Rb or Cs.

HOMOGENEOUS CATALYSIS

Oxidation Using Ruthenate

JOHNSON MATTHEY & CO. LTD. *European Appl.* 13,797

Organic substrates are oxidised by adding them to an aqueous solution containing ruthenate ions as catalyst in the presence of an oxidising agent such as an aqueous alkaline persulphate solution. The catalyst is produced in situ by adding a Ru trihalide to an aqueous solution of the oxidising agent.

Olefin Hydration

UNIVERSITY OF SHEFFIELD AND BP CHEMICALS LTD.

European Appl. 17,424

Ethanol is formed by bubbling ethylene through an aqueous solution of mercuric acetate containing a catalyst which is preferably $[\text{Rh}_2(\text{C}_5\text{Me}_5)_2(\text{OH})_2]\text{Cl}\cdot x\text{H}_2\text{O}$.

Platinum Hydroformylation Catalyst for Aldehyde Production

SHELL OIL CO.

U.S. Patent 4,198,352

Internal olefins are hydroformylated to linear aldehydes by contact with H_2 and CO over a catalyst consisting of a ligand-stabilised ionic compound of formula $\text{PtCe}(\text{CO})_2(\text{Ligand})_2\text{X}$, complexed with modifying Sm, Zn or Ge halides. The Pt compound is typically $\text{PtCe}_2(\text{PPh}_3)_2$.

Rhodium Carbonyl Sulphur Cluster Complexes

UNION CARBIDE CORP.

U.S. Patent 4,199,520

A new catalyst for the manufacture of polyhydric alcohols from synthesis gas is a Rh carbonyl cluster complex having an anion of formula $[\text{Rh}_7\text{S}_2(\text{CO})_{32}]^{-3}$. The cation may be ammonium, tris (triorgano phosphine) iminium or a Group IA or IIA metal.

Hydroformylation Co-catalysts

JOHNSON MATTHEY & CO. LTD.

U.S. Patents 4,200,591/2

Straight chain aldehydes are produced from internal olefins by catalytic hydroformylation in the presence of a Rh complex, such as $\text{RhH}(\text{CO})(\text{PPh}_3)_3$, in solution in the presence of a co-catalyst. In *U.S. Patent* 4,200,591 the co-catalyst is heterogeneous and consists of Pt, Pd, Rh, Ir or Ru on a suitable support. In *U.S. Patent* 4,200,592 a homogeneous co-catalyst consisting of a co-ordination compound of Pt, Pd, Ru, Cr, Mo, W, Fe or Co, such as $\text{Pd}(\text{acac})_2$ is used.

FUEL CELLS

Platinum-Vanadium Fuel Cell Catalysts

UNITED TECHNOLOGIES CORP. *U.S. Patent* 4,202,934

An alloy of a platinum group metal (Pt is used in all examples) with V produces high-surface-area catalysts for fuel cell cathodes. The alloy is prepared by reacting a V compound with Na dithionite to form a sol of a finely divided V sulphite complex and then reacting Pt particles with the complex.

CHEMICAL TECHNOLOGY

Sulphur Trioxide Reduction

WESTINGHOUSE ELECTRIC CORP.

British Patent 1,575,444

More efficient use of electricity may be obtained if power produced in off-peak periods is used to decompose water. Most of the processes use as one step the decomposition of SO_3 . This decomposition is now achieved by passing gaseous SO_3 over a sulphuric acid contact catalyst, which may be Pt, at a temperature between 750 and 1000°C, and at a high space velocity.

ELECTRICAL AND ELECTRONIC ENGINEERING

Hydrogen Storage

JOHNSON MATTHEY & CO. LTD.

British Patent 1,572,796

An intermetallic H_2 storage material, such as LaNi_5 , TiFe and Mg_2Ni is held in a chamber having a H_2 permeable Pd or Pd alloy, such as 80% Pd-20% Ag membrane. The chamber preferably, acts as a heat exchanger and has external heating elements and/or fluid filled heat exchange tubes.

Producing Metallic Patterns on Substrates

WESTERN ELECTRIC CO. INC. *British Patent* 1,573,241

A "colloidophobic" material such as PTFE containing Pt, Pd, Ag, or the like is deposited on the surface of a non-conductor in the required pattern and used as a catalyst for depositing Pd and Cu by an electroless plating method.

Magnetic Collectors

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

British Appl. 2,042,274 A

Ferromagnetic particles used in a collector for removing particles from liquids in nuclear fuel reprocessing are encased in an acid resistant metal, such as stainless steel, Pt, Pd or Au. In a preferred arrangement the particles are encapsulated between two metal tubular sheets.

Magnetic Material

AGENCE NATIONALE DE VALORISATION DE LA

RECHERCHE (ANVAR)

French Appl. 2,433,483

A new magnetic material for audio and video recording media is a Cr-Rh oxide solid solution $\text{Cr}_{1-x}\text{Rh}_x\text{O}_2$, where x is preferably about 0.1.

I.C. Engine

JOHNSON MATTHEY & CO. LTD.

German Offen. 3,000,497

In an I.C.E. of improved efficiency each cylinder is provided with a fuel oxidation catalytic device which is a block of metal, preferably Ni or Co or alloys thereof, pierced with a multiplicity of channels. The internal surfaces of the channels are coated with a platinum group metal catalyst.