

The Sintering of Tantalum with Transition Metal Additions

R. M. GERMAN and Z. A. MUNIR, *Powder Metallurgy*, 1977, 20, (3), 145-150

The sintering behaviour of Ta powders with Rh, Pd, Ir and Pt was studied at 1250-1700°C. Pt, Pd and Rh caused densification by a slight shrinkage, but none was obtained with addition of Ir. Pd shrinkage was lower than expected due to a high surface diffusivity.

Recovery of Solubilized Rhodium from Hydroformylated Vegetable Oils and Their Methyl Esters

E. J. DUFEK and G. R. LIST, *J. Am. Oil Chem. Soc.*, 1977, 54, (7), 276-278

The extraction of Rh from hydroformylated vegetable oils and methyl esters by different reagents was examined. Aqueous hydrogen cyanide with triethanolamine (TEA) was the most effective, and the effects of time, temperature and reagent concentration were studied. Over 98% of Rh was removed from methyl formylstearate at 100°C for 1 hour with 0.5% HCN, 5% H₂O and 0.5% TEA. 98% of Rh was extracted from hydroformylated soya bean and safflower methyl esters with 1% HCN, 10% H₂O and 0.62 TEA, and 90% Rh from hydroformylated soya bean oil.

NEW PATENTS

METALS AND ALLOYS

Rhodium Alloys

INTERNATIONAL BUSINESS MACHINES CORP.

U.S. Patent 4,023,965

The alloys, for use in magnetic devices and which enhance corrosion resistance, contain 65-90% Ni, 10-35% Fe and 1-25% Rh.

Titanium Alloy

JOHNSON MATTHEY & CO. LTD.

Dutch Appl. 76.13127

The corrosion resistance of Ti alloys is improved by the incorporation of 6-40% of one or more of Rh, Ru, Pt and Pd, although Ir may also be present. One alloy contains 6% Pt and 6% Ir.

CHEMICAL COMPOUNDS

Platinum or Silver Hydroxymercaptan Salts

AMERICAN CYANAMID CO.

U.S. Patent 4,018,807

Certain metal salts, such as the Pt and Ag salts of aromatic o-hydroxymercaptans, are prepared by the reaction of an aromatic o-hydroxythiocyanate with a water-soluble salt of the metal in the

ELECTRICAL AND ELECTRONIC ENGINEERING

Low as Fired Distribution Eliminate Most Thick Film Resistor Trimming

F. E. BUZAN, *Solid State Technol.*, 1977, 20, (8), 40, 42

A new Ru oxide resistor paste provides low as fired distributions typically 1 Sigma level of 2.5%. This eliminates the need for trimming resistors with tolerance levels greater than $\pm 5\%$.

MEDICAL USES

On the Mechanisms of Action of Platinum Complexes as Anticancer Agents

B. ROSENBERG, *J. Clin. Hematol. Oncol.*, 1977, 7, (2), 817-827

Experiments with Pt drugs for anticancer properties show that they may act by enhancing the antigenicity of tumour cells, thus allowing the immune system to destroy the cancer without killing the cell. Only *cis* configurations are active, showing Pt does not simply act with non-specific toxicity, and Pt drugs act by causing a lesion on cellular DNA. A reaction to explain the anticancer activity is proposed.

presence of a strong mineral acid. The salts can be incorporated into plastic lenses to afford eye protection against laser radiation.

ELECTRODEPOSITION AND SURFACE COATINGS

Platinum Coating for Electrodes

EXXON RESEARCH & ENGINEERING CO.

British Patent 1,484,645

A photogalvanic device has a thin layer of Pt on a glass surface for use as an electrode.

Platinum Group Metals for Bipolar Press Cell

B.A.S.F. WYANDOTTE CORP.

British Patent 1,487,237

In the cell, a connection between the anode and cathode can be made of a Pd-Ti alloy and the anode may be coated with one or more Pt group metals or their oxides.

Platinum Group Layer for Electrodes

SIEMENS A.G.

British Patent 1,487,485

Electrodes for fuel cells are coated with a catalytic layer of an alloy of a Pt group metal and an Fe group metal, a suitable alloy being of Pt-Ni.

Plating a Substrate

K.K. DAINI SEIKOSHA *British Patent 1,488,559*

A dry plating process is used to apply a first metallic layer of Pd, Pt, Au or Cu to a substrate, and a wet process is used to deposit a second metallic layer of Au.

LABORATORY APPARATUS AND TECHNIQUE

Dissolved Oxygen Probes

FISCHER AND PORTER CO.

British Patent 1,483,987

A probe for continuously measuring the concentration of O₂ dissolved in a liquid has a Pt or Au measuring electrode.

Noble Metal Electrode for Electrochemical Gas Sensor

GENERAL ELECTRIC CO. *U.S. Patent 4,025,412*

The electrode, for the sensor, is made of a noble metal alloy, such as Pt-Ir and is used in association with a Pd foil.

Carbon Monoxide Detection

NATIONAL RESEARCH DEVELOPMENT CORP.

U.S. Patent 4,036,592

CO is detected in the presence of H₂ in combustion exhaust gases by a catalytic alloy of Pt with not less than 10% Rh. The alloy is held at a temperature where CO, but not H₂, burns.

Hydrogen Storage

JOHNSON MATTHEY & CO. LTD.

German Offen. 2,658,648

The hydrogen is concentrated by diffusion through a Pd membrane (optionally as an alloy with up to 20% Ag), and collected in a material which will absorb it reversibly, such as LaNi₅, Mg₂Ni or Ti-Fe alloys.

HETEROGENEOUS CATALYSIS

Ruthenium Containing Perovskites

JOHNSON MATTHEY & CO. LTD.

British Patent 1,482,516

A catalyst comprises BaRuO₃, CaRuO₃, SrRuO₃ or MgO/RuO₂ together with Pt in free elemental or oxide form, and is used for the purification of I.C.E. exhaust.

Catalytic Destruction of Chlorinated Hydrocarbons

NATIONAL RESEARCH & DEVELOPMENT CORP.

British Patent 1,485,375

A fuel which is H₂ and a hydrocarbon is flamelessly burned in a bed of catalyst comprising metallic Rh, Pd, Ir or Pt or compounds thereof and the chlorinated hydrocarbon is passed into the catalyst bed in which the fuel is burning.

Selective Hydrogenation Catalyst

JOHNSON MATTHEY & CO. LTD.

British Patent 1,487,915

Catalysts for the hydrogenation of nitric oxide to hydroxylamine comprise a support and a catalytic material consisting of one or more of the elements Ir, Ni, Ag and Au, one of the elements Ru, Rh, Pd, Os and Pt, and Si.

Catalytic Tube for Methanation

INSTITUT NAWOZOW SZTUCZNYCH

U.S. Patent 4,019,969

Catalytic tubes for methanation and steam reforming of hydrocarbons have wall supported catalysts chosen from Ru, Ir, Os, Pt, Pd, Fe, Mo, Ag, Co, Th and Ni.

Rhodium and Ruthenium Catalyst for Treating Exhaust Gases

U.O.P. INC. *U.S. Patent 4,020,013*

A composite consists of a high surface area refractory inorganic oxide containing Rh and Ru impregnated onto it in a weight ratio of 1:1 to 2:1. The Rh makes up 0.02-0.10% by weight of the composite.

Group VIII Multimetal Catalyst

U.O.P. INC. *U.S. Patent 4,024,199*

Alkylaromatic hydrocarbons are isomerised using a catalyst which consists of a porous alumina carrier bearing 0.01-2.0% Pt or Pd, 0.01-2.0% Rh, 0.01-5.0% Sn and 0.1-10.0% halogen.

Palladium Hydrogenation Catalyst

EXXON RESEARCH & ENGINEERING CO.

U.S. Patent 4,025,459

The addition of liquid HF or liquid Bronstead acids containing F to Pd, Pt or Ir gives a catalyst which shows a hydrogenation activity which is enhanced by 10-144 times. The addition of a F-containing Lewis acid to the HF or acid can increase the hydrogenation by up to 3500 times as much.

Platinum or Rhodium Isotope Exchange Catalyst

ATOMIC ENERGY OF CANADA LTD.

U.S. Patent 4,025,560

Hydrogen isotopes are exchanged between streams of gaseous H₂ and liquid H₂O by contacting them with a catalyst at 0-300°C. The catalyst consists of a hydrophobic material, such as PTFE, and an active metal such as Pt or Rh.

Platinum and Palladium Oxidising Catalysts

AIR PRODUCTS AND CHEMICALS INC.

U.S. Patent 4,025,605

Low concentrations of oxidisable organic contaminants are removed from O₂ containing inert gases by an absorption process which uses a Pt and/or Pd metal or complex oxidising catalyst.

Catalytic Oxidation Process

JOHNSON MATTHEY & CO. LTD.

U.S. Patent 4,025,606

A process for the oxidation of CO or hydrocarbons and uncombined O₂ to CO₂ and water uses a catalyst which consists of an inert support coated with an intermediate layer of Sc, Y and/or a lanthanide oxide and a catalytically active surface coating of an alloy chosen from Pt-Rh-base metal alloys which contain 1-50% Rh, 0.01-25.0% base metal and the rest Pt. The base metal used may be Ag.

Palladium Ruthenium Alloy Catalyst

V.M. GRYANZNOV ET AL. *U.S. Patent 4,026,958*

An alloy of 90-98% Pd and 2-10% Ru is used as catalyst for the dehydrogenation of hydrocarbons such as cyclohexane.

Fluoriding Noble Metal Catalysts

SHELL OIL CO.

U.S. Patent 4,032,474

Catalysts in a fixed bed, including noble metal catalysts, especially Pd and Pt, are fluorided in situ by providing an amount of F which is in excess by at least 10% of the amount of F absorbed by the catalyst.

Platinum Group Catalyst for Hydrocracking Processes

PHILLIPS PETROLEUM CO. *U.S. Patent 4,035,283*

The catalyst consists of alumina supported Pt, Ir, Os, Ru, Rh or Pd metal activated at high temperature by a gas consisting of a H halide, a halosilane and an organic halide.

Platinum Group Catalyst for the Direct Oxidation of Olefins

AGENCE NATIONALE DE VALORISATION DE LA RECHERCHE *French Appl. 2,310,987*

The direct oxidation of 3-30C olefins is carried out in a single stage process using at least two metal catalysts: the first is an Os, Rh, Ir, Ni, Ru or Co compound and the second is a Mo, W, V, Ti, Nb or Cr compound.

Platinum-containing Isomerisation Catalyst

CIE. FRANCAISE DE RAFFINAGE

French Appl. 2,320,775

A catalyst for hydrocarbon isomerisation reactions consists of a refractory support, a metallic halide component, a Pt group metal, especially Pt, and at least one of Ti, Zr, W and Mo.

I.C.E. Exhaust Gas Purification

FORD-WERKE A.G.

German Offen. 2,649,825

An I.C.E. catalytic converter is divided into at least two parts with a Rh and/or Ir catalyst in the first part or parts and a Pt and/or Pd catalyst in the last part.

Fat Hardening

JOHNSON MATTHEY & CO. LTD.

Dutch Appl. 77,01385

An oil of animal or vegetable origin is selectively hydrogenated over a supported catalyst containing a Pt group metal, Fe, Co and/or Ni, especially Pd/C or an alloy deposited on stainless steel.

HOMOGENEOUS CATALYSIS

Platinum/Cobalt Hydrosilylation Catalyst

S.W.S. SILICONES CORP.

U.S. Patent 4,033,902

The catalyst, for promoting the addition of $\equiv\text{Si-H}$ compounds to unsaturated organic compounds, is prepared by reacting PtCl₂ with Co(CO)₈ at up to 52°C in the presence of an inert solvent.

CHEMICAL TECHNOLOGY

Rejuvenation of Platinum Catalysts

INVENTA A.G. FÜR FORSCHUNG UND PATENTVERWERTUNG *British Patent 1,480,154*

The aged catalyst is treated in an acid medium in the presence of a hydroxylamine salt with a S compound which releases H₂SO₃, and subsequently treating it in an acid medium, in the presence of H₂, with an aqueous solution of a Pt⁴⁺ or Pt²⁺ compound.

Separating and/or Purifying Secondary Platinum Group Metals

SWARSAB MINING, EXPLORATION AND DEVELOPMENT CO. (PTY) LTD. *British Patent 1,481,385*

Rh, Ru, Ir and Os are separated from a concentrate by heating the concentrate in a stream of O₂.

P.G.M. Recovery from Catalysts

JOHNSON MATTHEY & CO. LTD.

British Patent 1,486,413

Pt group metals are recovered from supports by mechanical reduction of the catalyst to give a fines portion and a tails portion, the majority of the metallic value being in the fines portion, and then separation of the portions.

Treating Plastic Substrates prior to Plating

OXY METAL INDUSTRIES CORP.

British Patent 1,487,243

Plastic substrates may be activated by contact with an acidic Sn/Pd complex, and then accelerated by the use of a solution of a Pt group metal salt.

High-temperature Resistant Metal Powders

JOHNSON MATTHEY & CO. LTD.

French Appl. 2,316,029

The powders consist of refractory particles coated with a layer of Pt, Pd, Rh, Ru, Ir, Os, Au, Ag or their alloys.

Cermets

JOHNSON MATTHEY & CO. LTD.

German Offen. 2,658,647

A major proportion of the surface of a finely divided refractory ceramic oxide, carbide or nitride is coated with an additive containing Y, Al, Ti, V, Cr or Ni which will act as a binding agent for a chemically deposited metal which is Pt, Ag, Ru, Rh, Pd, Os, Ir, Au or their alloys.

GLASS TECHNOLOGY

Vitrified Ceramic Product Containing Platinum Group Metals

GESELLSCHAFT FÜR KEMFORSCHUNG G.m.b.H.

French Appl. 2,319,593

The products, for use in the elimination of radioactive residues, consist of a matrix which contains a borosilicate glass, a nucleating agent, some metal fluorides and finely divided precious metals such as Ru, Rh or Pd.

ELECTRICAL AND ELECTRONIC ENGINEERING

Electrical Resistor

HOECHST A.G.

British Patent 1,478,919

A resistor comprises a sheet of electrically resistive open-meshed fabric having as a terminal a metallic contact strip, such as a Pt group metal, Au, or Ag, covering a part of one of its surfaces.

Bonding a Semiconductor Device to an Electrical Conductor on a Supporting Substrate

INTERNATIONAL BUSINESS MACHINES CORP.

British Patent 1,481,015

The device is placed on the substrate with a solder pad formed on the device in contact with the electrical conductor. The solder pad is heated to cause solder reflow and the formation of a ternary intermetallic including Pd dispersed within the solder.

Multisubstrate Interconnected Printed Circuit Module

WESTINGHOUSE ELECTRIC CORP.

British Patent 1,481,590

Pt-Au or Pd-Ag screen printed pastes and Sn-Pb-Ag solder are used in interlayer connecting means for multisubstrate interconnected printed circuit modules which can be quickly and easily disassembled.

Platinum-layer in Resistance Structure

W.C.HERAEUS G.m.b.H. *U.S. Patent 4,028,657*

A thermometric resistance structure has a layer of Pt applied in a resistor pattern configuration on the intermediate lanthanide, Ti or Fe oxide or oxides of an alumina ceramic structure.

Platinum Resistor Pattern on Ceramic Heating Device

KYOTO CERAMIC CO. LTD. *U.S. Patent 4,035,613*

A cylindrical ceramic heating device is described which can have a Pt heat generating resistor pattern.

Storage Battery Electrodes

DIAMOND SHAMROCK TECHNOLOGIES S.A.

U.S. Patent 4,037,032

An electric storage battery using an aqueous bromide electrolyte has a cathode comprising a Ti base coated with a Pt metal oxide or oxides and a valve metal oxide.

MECHANICAL ENGINEERING

Turbine Blade Construction

GESELLSCHAFT FÜR KERNFORSCHUNG G.m.b.H.

U.S. Patent 4,036,601

A turbine blade consists of a core of resistant alloy, such as Mo-Re covered with a corrosion and heat-resistant cover of Re, Rh, Ir and/or Pt.

TEMPERATURE MEASUREMENT

Platinum or Palladium Thermopile

UNITED STATES SURGICAL CORP.

British Patent 1,483,410

A temperature and respiration detector contains a thermopile which can optionally be constructed from Pt or Pd.

Resistance for Thermometer

DEUTSCHE GOLD- & SILBER-SCHNEIDANSTALT

German Offen. 2,558,752

A resistance thermometer incorporates a thin layer of Pt obtained by sputtering it on to an insulating substrate in an atmosphere of Kr and O₂ or Xe and O₂.

MEDICAL USES

Platinum Ceramic Dental Alloy

NATIONAL RESEARCH & DEVELOPMENT CORP.

British Patent 1,483,362

An alloy for dental restoration work is prepared by firing porcelain on to a noble metal substrate, specifically Pt, which is carrying an intermediate adherent layer of a metal oxide, such as Sn or In oxide.

Platinum Catalyst for Dental Impression Material

WACKER-CHEMIE G.m.b.H. *U.S. Patent 4,035,453*

A dental impression material which contains (di)organopoly-siloxanes also contains a Pt catalyst capable of promoting the addition of Si-bonded hydrogen to vinyl groups at room temperature.