

Drawing of Pd_{77.5}Cu₈Si_{16.5} Metallic Glass Wires

S. TAKAYAMA, *Mater. Sci. Engng.*, 1979, **38**, (1), 41-48

Wires of Pd_{77.5}Cu₈Si_{16.5} metallic glass were cold drawn using diamond dies. A total area reduction of up to about 93% was obtained after multiple passes through appropriate dies. Tensile tests conducted on both drawn and undrawn wires show fracture in planes that always deviate from the 45° maximum shear phase. The fracture stresses of drawn wires are found to be slightly increased; the macroscopic elongation to break increases considerably after cold drawing.

ELECTRICAL AND ELECTRONIC ENGINEERING

Contact Reactions in Pd/GaAs Junction

J. O. OLOWOLAFE, P. S. HO, H. J. HOVEL, J. E. LEWIS and J. M. WOODALL, *J. Appl. Phys.*, 1979, **50**, (2), 955-962

X-ray diffraction studies of the solid-state reaction of thin Pd films with GaAs substrates were performed. Fast diffusion and dissolution were observed for both As and Ga into Pd, which slowed down after the formation of distinct compound layers. These were identified as PdAs₂ and PdGa at 250°C, PdAs₂, PdGa and Pd₂Ga at 350°C and PdGa at 500°C.

NEW PATENTS

METALS AND ALLOYS

Palladium-Containing Alloys

INTERNATIONAL BUSINESS MACHINES CORP.

British Patent 1,539,686

Improved ferromagnetic alloys for use such as in bubble domain devices have the general formula Ni_{100-x-y}Fe_xPd_y, where x is 25-80 at. % and y is 25-65 at. %.

Nickel Glow Plug Alloys

NGK SPARK PLUG COMPANY LTD.

British Appl. 2,003,501

An alloy for use in a glow plug heater used in I.C.E., particularly diesel engines, contains Ni and between 0.05 and 2.0% of Y, Zr and/or Ru. The additions prevent grain coarsening and high temperature degradation without affecting the electrical resistance of the material.

Amorphous Alloys

SONY CORP.

British Appl. 2,003,772

A continuous-casting process for the manufacture of amorphous alloys is applicable to Fe-P-C alloys containing minor amounts of Ru, for instance Fe₇₈Ru₂P₁₃C₇.

TEMPERATURE MEASUREMENT

Appraisal of Interpolation Instruments for the International Practical Temperature Scale from 630.74 to 1064.43°C

L. A. GUILDNER, H. J. KOSTKOWSKI and J. P. EVANS, *Metrologia*, 1979, **15**, (1), 1-4

Two replacements for the Pt:10% Rh-Pt thermocouple currently being used as the standard temperature measuring device for IPTS-68 (International Practical Temperature Scale 1968) from 630°C to the gold point are considered. These are a high temperature Pt resistance thermometer (PRT) and a photoelectric spectral pyrometer (PSP). The PRT has many advantages over the PSP, including the fact that essential supporting technology is already widely known.

MEDICAL USES

Synthesis of Spin-Labelled Platinum Drugs and Interaction with Deoxyguanosine

A. MATHEW, B. BERGQUIST and J. ZIMBRICK, *J. Chem. Soc., Chem. Commun.*, 1979, (5), 222-224

Two novel spin-labelled *cis*-Pt drugs have been synthesised, and allowed to react with deoxyguanosine to form a spin-labelled complex. This spin-labelled Pt complex is useful for studying the interaction of Pt drugs with DNA.

Palladium-Containing Brazing Alloy

COMPTOIR LYON-ALEMAND LOUYOT

French Appl. 2,378,601

A "high-temperature" brazing alloy consists of 20-80% transition metal, such as Ni, Fe and/or Co, 0.5-15% Ge and 5-40% Pd.

CHEMICAL COMPOUNDS

Ruthenium and/or Iridium-Containing Pyrochlore Compound

EXXON RESEARCH & ENGINEERING CO.

U.S. Patent 4,129,525

Electrically conductive pyrochlore compounds have the formula A₂(B_{2-x}A_x)O_{7-y} where A is Pb and/or Bi, B is Ru and/or Ir, x is 0-1.0 and y is 0-1.0.

Adhesive Organopolysiloxanes

WACKER-CHEMIE G.M.B.H. *U.S. Patent* 4,130,707

The adhesive compounds contain vinyl-containing organopolysiloxanes, organopolysiloxanes containing Si-H atoms and Group VIII metal

catalysts (Pt-olefin complexes). Conductive materials (Al or Ag) are added to the adhesives to form flexible heating resistors.

ELECTROCHEMISTRY

Electrolytic Cell

HANS EINHELL G.m.b.H. *British Patent 1,539,008*
A cell for the electrolytic purification and sterilisation of water and which has an anode of a platinum group metal or platinised Ti or Nb is designed to prevent the accumulation of impurities on the electrodes.

ELECTRODEPOSITION AND SURFACE COATINGS

Palladium Electroplating

SIEMENS A.G. *British Patent 1,539,303*
Pore-free, ductile, bright coatings are obtained by electrodeposition from ammonia-free baths containing a diglycocol Pd complex.

High Temperature Resistant Coatings

GENERAL ELECTRIC CO. *U.S. Patents 4,123,594-95*
Fe-Co-Ni superalloys are protected from high temperatures using a diffused graded coating which on the side adjacent to the superalloy contains 10-50% Cr, up to 30% Al, up to 10% Hf, up to 3% Y and up to 30% of Pt, Rh and/or Pd while on the outside the coating contains 10-50% Al and 1-40% of Hf, Pt, Rh and/or Pd, the balance being elements diffused out.

LABORATORY APPARATUS AND TECHNIQUE

Gas Lasers

FERRANTI LTD. *British Patent 1,540,619*
A pellet of Pt black powder, compressed under high pressure (50 tsi), is used as the cathode of a gas discharge layer. The electrode contains up to 25% of cupric oxide to reduce unwanted constituents of the gas mixture.

Oxygen Measuring Probes

DRAGERWERK A.G. *British Patent 1,540,751*
A microprobe for measuring O₂ partial pressures, especially in aqueous biological solutions, has a measuring electrode made of a thin film of noble metal or alloy, preferably Pt or Au, and a counter electrode of Pt, Ag or Au.

Platinum Wire for Combustible Gas Detector

ENGLISH ELECTRIC VALVE CO. LTD. *U.S. Patent 4,123,225*
A heatable Pt wire is embedded in a pellet of Al₂O₃/zeolite to provide the detector.

HETEROGENEOUS CATALYSIS

I.C.E. Exhaust-Gas Purification Catalyst

GENERAL MOTORS CORP.

British Patent 1,537,732-33

An I.C.E. exhaust gas catalyst comprises particulate Al₂O₃ of specified pore characteristics impregnated to a depth of 90-250 μm with Pt and optionally Pd.

Intermetallic Three-Way Catalyst

JOHNSON MATTHEY & CO. LTD.

British Appl. 2,002,648

Three-way catalysts for I.C.E. purification are formed from an intermetallic compound supported on a metal or ceramic, preferably with an intermediate refractory metal oxide layer between the catalyst and support. The intermetallics have the formula A_xB_y, where A is a Group VIII metal and B is Al, Sc, Y, the lanthanides, Ti, Zr, Hf, V, Nb or Ta. Ni₃Al and Ni_{2.86}Pt_{0.14}Al intermetallics are used in the examples.

Platinum Group Metal Catalyst

GULF RESEARCH & DEVELOPMENT CO.

U.S. Patent 4,122,039

The catalyst is prepared by coating a support with a Pt or Pd salt and a Rh salt, calcining, then coating with a Ru salt and an oxide, salt or acid of phosphorus and then calcining again. The catalyst is used for treating I.C.E. exhaust gases.

Lanthanum Rhodite Catalyst

JOHNSON MATTHEY & CO. LTD.

U.S. Patent 4,127,510

The catalyst is of formula M_xM'_yO_z (M is Li, Na, K, Mg, Ca, Sr, Ba, Al, Sc, Y, a lanthanide, Ti, Zr, V, Cr, Mn, Fe, Co, Ni, Cu and/or Zn, M' is Ir, Rh, Pt, Pd or Ru, y is 0.1-3.0, z is 2-7, x has a value such that the compound is electrically neutral). The catalyst may be disposed on a ceramic or metallic support optionally with an intermediate refractory oxide.

Iridium Catalyst for Treating Light Petroleum Fractions

STE. NATIONALE ELF AQUITAINE

French Appl. 2,376,203

A catalyst for the simultaneous production of ethane and high octane petrol by the selective hydrogenation of light petrol fractions consists of a porous refractory oxide support, Ir and Rh, Os, Pt, Pd, Ru, Ni, Fe or Co.

Supported Intermetallic Catalysts

JOHNSON MATTHEY & CO. LTD.

French Appl. 2,379,317

A catalyst, for use in the production of nitric acid from NH₃ consists of a support coated with a refractory metal oxide and an intermetallic

compound of formula $M_xM'_y$ (M is Ru, Rh, Pd, Ir or Pt, M' is Al, Sc, Y, the lanthanides, Ti, Zr, Hf, V, Nb and Ta, x and y are each at least 1).

HOMOGENEOUS CATALYSIS

Release Coatings

DOW CORNING CORP. *British Patent 1,542,072*

A release coating for use on paper, fabric, foil, etc. contains a diorganopolysiloxane, a toluene-soluble resinous copolymer containing organosilicon units and a Rh catalyst of formula $RhX_3(SR'_2)_3$ or $Rh_2(CO)_4X_2$, where X is a halogen, R' is an alkyl, aryl, aralkyl or alkaryl group or R''_3SiQ , where Q is a C_{1-6} divalent aliphatic hydrocarbon radical. The preferred Rh catalyst is $RhCl_3(n-Bu_2S)_3$.

Homogeneous Hydroformylation Co-Catalyst

JOHNSON MATTHEY & CO. LTD.

British Appl. 2,000,124

The hydroformylation of olefins is catalysed by a system containing a Rh complex, particularly a hydrido carbonyl triphenyl-phosphine or -phosphite complex and a co-ordination complex of a Group VI or VIII transition metal, preferably Pd, Pt, Ru, Cr, Mo, W, Fe or Co.

Palladium Complex Catalyst

V. K. BOYADZHAN ET AL. *Russian Patent 601,277*

Allyl acetate is obtained by the reaction of propylene in the gas phase with acetic acid and O_2 , in the presence of a catalyst which is a supported mixture of Na, Cu and Zn acetates and $\{Pd(NH_3)_4\}(OAc)_2$.

FUEL CELLS

Fuel Cell Reservoir

UNITED TECHNOLOGIES CORP.

British Patents 1,541,541-42

An absorbent reservoir, located adjacent to the catalyst layer of a fuel cell, has shallow surface areas impregnated with a hydrophobic area and feed areas of hydrophobic material extending from the non-catalytic surface to the impregnated areas. The catalyst layer, which is preferably bonded to the reservoir material, is of Pt/p.t.f.e. and the porous reservoir material can be made from C paper, if the electrolyte is phosphoric acid, or from Ag felt or sintered Au or Ag powder if the electrolyte is KOH.

CHEMICAL TECHNOLOGY

Heat Pump

ALLIED CHEMICAL CORP. *British Patent 1,539,287*

The action of a heat pump depends on the thermal cycling of a polyhalomethane in a solvent which is an asymmetrical furan derivative. One of the

stages in the synthesis of the furan derivative is the conversion of a furfuraldehyde to a tetrahydrofurfuryl alcohol with H_2 in the presence of, for instance, a Rh-Pt oxide catalyst.

Recovery of Platinum Group Metals

MATTHEY RUSTENBURG REFINERIES (PTY) LTD.

U.S. Patent 4,127,458

The metals are recovered from aqueous effluent from a platinum group metal refinery by adjusting the pH of the effluent to at least 10, heating it at above $60^\circ C$, electrolysing it using an electrode consisting of Ru, Rh, Pd, Ir, Pt; and/or their alloys so as to precipitate any metal present and filtering off the precipitated metal.

GLASS TECHNOLOGY

Glass Optical Fibres

STANDARD TELEPHONES & CABLES LTD.

British Patent 1,541,442

Optical fibres are manufactured by drawing molten glass fibres from a double crucible, made from Pt, which is designed to allow continuous fibre withdrawal without glass replenishment.

Optical Glass

ERNST LEITZ WETZLAR G.m.b.H.

British Appl. 2,000,491

A borosilicate glass of specified optical properties may contain various metal oxides, such as La_2O_3 or Y_2O_3 , as additives. It is produced by heating the constituents in a Pt crucible.

ELECTRICAL AND ELECTRONIC ENGINEERING

Acoustical-Optical Device

INTERNATIONAL BUSINESS MACHINES CORP.

British Patent 1,537,816

An acoustical-optical device is obtained by bonding together a piezoelectric crystal and an optical deflection crystal by way of a bond-enhancing metal (such as Cr, Al or Ti) and a layer of Pt, Pd or Au.

Palladium-Containing Multilayer Ceramic

INTERNATIONAL BUSINESS MACHINES CORP.

U.S. Patent 4,109,377

A multilayer ceramic for carrying semiconductor chips consists of layers of a mixture of a metal and its oxide, such as Pd, on unfired ceramic layers and drying.

Platinum Group Metal Contacts for Solar Cells

J. LINDMAYER

U.S. Patent 4,124,455

A contact for a solar cell consists of a Ti group element in contiguous relationship with the cell, a mixture of Ti group element and platinum

group metal layered over this, a layer of a platinum group metal over this and a body of Ag or other contact metal adhered to this.

Electrical Switch

FUJITSU LTD. *U.S. Patent 4,128,823*

A switch consists of two sets of rod-shaped fixed electrodes and one cylindrical moving electrode of permanent magnetic form. Cracking of the contact layers is avoided by using Ag, Ni, Cu or alloys of these metals as a first adhesive layer coated with Rh, W, Re, Ru or Ag-W alloy.

TEMPERATURE MEASUREMENT

Radiation Pyrometer

INTERNATIONAL BUSINESS MACHINES CORP.
British Patent 1,538,824

A radiation pyrometer consists of a thermally conductive, electrically insulating substrate, such as glass, coated with at least two films of metal separated by a film of thermally conductive, electrically insulating material, for instance, SiO₂. The metal layers may be of Os or Pt, and the device is provided with electrodes of Ag.

Resistance Thermometer

DEUTSCHE GOLD- UND SILBER-SCHNEIDANSTALT
British Patent 1,538,948

A precision resistor for a resistance thermometer is made by sputtering Pt on to an insulating support in an atmosphere of Kr or Xe and O₂.

Pyrometric Sheath

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION *British Appl. 2,000,642*

The Pt thimble normally used to protect a thermocouple in an open-ended (Al₂O₃) sheath, such as in glass making, is replaced by a Pt foil integrally bonded across the tube.

Glass-Free Temperature Sensor

JOHNSON MATTHEY & CO. LTD.
British Appl. 2,002,175

The temperature coefficient of resistance disadvantages of thin resistance films on non-conductors are avoided by using thick metal films (at least 2.5 μm thick) applied to the non-conductor by screen printing. The metal may comprise Ru, Rh, Pd, Ir, Pt, Ni, Cu, Ag, Au, Fe, Co or their alloys.

Molybdenum-Iridium Alloys for Thermocouples

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
U.S. Patent 4,111,718

Bimetallic thermocouple sensor metals consist of Ir with 0-22 at. % Mo dissolved in it.

Platinum Group Metal Thermocouple Wires

THERMAL SYNDICATE LTD. *U.S. Patent 4,125,738*

An improved high temperature (up to 1800°C) hot junction element is described for a thermocouple circuit in which the dissimilar wires are made of, for example, Pt, Rh or Pt-Rh alloy.

MEDICAL USES

Cardiac Stimulants

IMPERIAL CHEMICAL INDUSTRIES LTD.
British Appl. 2,002,748

1-hydroxyphenoxy-3-ureido-ethylamino-2-propanol derivatives, used as cardiac stimulants, are prepared by a route which includes use of benzyloxy protecting groups, which are subsequently removed by hydrogenolysis with a Pd catalyst.

Platinum Compounds

U.S. SECRETARY OF COMMERCE
British Appl. 2,003,468

4-carboxyphthalato(1,2-diamino-cyclohexane) Pt(II) and Group IB metal salts are used to alleviate murine leukaemia. The compounds are prepared by reacting dichloro(1,2-DAC)-Pt(II) with AgNO₃ and adding benzene tricarboxylic acid to precipitate the desired product.

Protective Packaging for Pharmaceuticals

ASTRA LAKEMEDEL A.B. *British Appl. 2,003,821*
Pharmaceutical preparations sensitive to oxidation, packed in ampoules, disposable syringes or vials, are enclosed in an outer container of O₂-impervious material into which H₂ and a catalyst are introduced to produce an O₂-free package. The catalyst is preferably a platinum group metal, such as 5% Pd/C.

Gold Dental Alloy

PENNWALT CORP. *U.S. Patent 4,123,262*
The alloy consists of 50-58% Au, 0.5-10.5% In, 0.5-8.5% Sn or 1.0-3.0% Ga, and the balance Pd.

Dental Alloy

DEUTSCHE GOLD- & SILBER-SCHNEIDANSTALT
German Offen. 2,813,813
A dental alloy contains 30-55% Au, 30-60% Pd, 1-12% Sn, 0-10% In, 0.1-3% Ge and 0.05-1% Re and/or Ru.

Pt-Clad Bone Joint Prosthesis

JOHNSON MATTHEY & CO. LTD.
German Offen. 2,824,063

A bone prosthesis is made of, for instance, stainless steel and has a surface coating of Pt, Ru or Ir or an alloy of at least one of these metals, preferably with Pd, Rh, Au and/or a base metal. The joint has good tribological properties.