

CATHODIC PROTECTION

Hydrogen Absorption and Embrittlement of Tantalum by Cathodic Loading

H. HEUBERGER, A. KNÖDLER and CH. J. RAUB, *Metall*, 1983, **37**, (3), 244-248

The takeup and embrittlement of Ta by electrolytically produced H₂ was investigated on various samples. The oxide surface layers affect the H₂ uptake. Surface coatings of varying thicknesses with platinum group metals as alloying constituents were tested as anodic protection for Ta.

ELECTRICAL AND ELECTRONIC ENGINEERING

Precious Metal Inlays for P.C. Connector Contacts

D. MADDICK, *New Electron.*, 1983, **16**, (2), 44, 46, 49

An evaluation of noble metal alloy inlays as replacements for Au electrodeposits is presented. Solderability, high temperature mechanical endurance, effects of rapid change of temperature, mechanical endurance, solvent resistance and costs were examined. Alloys considered were 6Pt-25Ag-69Au, 40Ag-60Pd and 6Ni-94Au of thicknesses 0.5 μ m and 0.75 μ m.

NEW PATENTS

METALS AND ALLOYS

Electrical Contact Material

DEGUSSA A.G. *European Appl.* 74,507

A lower priced material for contacts, especially low current contacts, consists of a noble metal (preferably Au, Ag and/or Pt) and 1-50% of a glass frit (softening range more than 100%, at 400-750°C).

Electric Contact Alloy

W.C. HERAEUS G.m.b.H. *German Offen.* 3,121,069

An improved dispersion-hardened contact material is a Ag alloy containing 10-30% Pd and 0.03-0.2% Mg as Mg oxide and 0.03-0.2% Ni, 0.1-0.5% Ce as Ce oxide or 0.1-0.5% Mn as Mn oxide.

ELECTROCHEMISTRY

Brine Electrolysis Cathode

DIAMOND SHAMROCK CORP. *U.S. Patent* 4,350,608

A power-efficient electrode, for use in a brine cell, is obtained by coating a substrate formed by compressing a prefused mixture of C black with PTFE with an electrocatalytic coating. A preferred coating contains chloroplatinic acid which may be reduced to Pt.

An Integrated CO-Sensitive MOS Transistor

D. KREY, K. DOBOS and G. ZIMMER, *Sens. Actuators*, 1983, **3**, (2), 169-177

MOS transistors with hole-structure Pd gates are detectors for CO. The CO-sensitive transistors, studied at 180°C, showed reproducible sensitivities with measured threshold shifts of 75mV for 0.1 Torr CO pressure. By using a protective Al layer on the Pd gate, a considerable improvement in CO selectivity with respect to H₂ was obtained.

TEMPERATURE MEASUREMENT

The Use of Industrial-Grade Platinum Resistance Thermometers between 77K and 273K

L. M. BESLEY and R. C. KEMP, *Cryogenics*, 1983, **23**, (1), 26-28

Measurements made on the stability of seven industrial platinum resistance thermometers when exposed to thermal cycling between 77K and 373K are described. A two point calibration method giving an accuracy of ± 35 mK for thermometers of this type over the range 70-273K is also described, which is better than that obtainable with IPTS-68.

Oxygen Generating Electrode

JAPAN CARLIT CO. LTD. *U.S. Patent* 4,353,790

An O₂ generating electrode, for use in electrowinning, electrodeposition and electrolysis cells, has improved durability when it is formed from Ti or a Ti substrate coated with a first layer of metallic Bi or Bi oxide and a top layer containing IrO₂ and 5-50 mole % metallic Ir, preferably applied via an Ir halide solution.

Energy Efficient Electrolyser for Hydrogen Production

WESTINGHOUSE ELECTRIC CORP.

U.S. Patent 4,357,224

A high surface area anode for use in an electrolyser for H₂ production has packed porous C pellets, preferably containing 1-5% Pt, pressed tight against an inert current collector which assists easy access of bisulphite ions to the anode. The conducting plate of the electrode may be of Pt, Au or TiO₂-coated Ti.

Anode Catalyst for Brine Electrolysis

GENERAL ELECTRIC CO.

U.S. Patent 4,360,416

A catalytic coating containing Ru oxide and 5-25% Mn oxide has good stability when used on an anode for halogen gas generation.

ELECTRODEPOSITION AND SURFACE COATINGS

Ruthenium Electroplating Bath

OCCIDENTAL CHEMICAL CORP.

British Appl. 2,101,633 A

Stable Ru plating baths which will deposit thick coatings ($>0.5 \mu\text{m}$) without cracking are based on a Ru sulphamic acid complex where the mole ratio of Ru : sulphamic acid is 4 to 10. Minor amounts of Ni, Co, Sn, Pb, Mg and/or Fe salts may be included in the bath as stress-relieving agents.

Palladium-Nickel Alloy Electroplating

LANGBEIN-PFANHAUSER WERKE A.G.

British Appl. 2,106,140 A

The corrosion resistance of an alloy film electroplated from a bath containing 5–30 g/l Pd and 5–30 g/l Ni as ammine complexes and sulphonic acid salts is improved by the presence of a compound of formula $\text{RSO}_2\text{NHCONR}'\text{R}''$, where R is aryl, R' and R'' are H, methyl and/or ethyl, such as "benzol sulphonyl urea".

Metal Deposition on Polymers

BASF A.G.

European Appl. 73,327

Metals are deposited on electrically conducting polymer supports by the reduction of complexes of the metal or its salt with O, N, S, P-complexing agents. Platinum group metals, Au, Ag and lanthanides are among the many metals that may be used. Nitrile complexes of Pt and Pd salts are used to deposit the metals on a polyacetylene film in one example. The coated film may be used in solar panels.

Platinum Plating Bath Based on a cis-Diamminodihalo-Platinum Complex

M.P.D. TECHNOLOGY CORP.

U.S. Patent 4,358,352

A Pt plating bath suitable for producing electrode coatings contains 8–10 g/l of Pt as a cis-diamminodichloro- or -diiodo-Pt complex, 15–25 g/l of NaCl or iodide and a liquid phase containing water and dimethyl-formamide in volume ratios of 1 : 1 to 1 : 2.

Palladium Electroplating

DEGUSSA A.G.

German Offen. 3,118,908

In a bath containing 2–50 g/l Pd, 80–95% of the metal is present as sulphate, the remainder as sulphite. The solution also contains 40–100 g/l of phosphoric acid or a mixture of phosphoric and sulphuric acids.

LABORATORY APPARATUS AND TECHNIQUE

Humidity Sensor

HITACHI LTD.

European Appl. 76,131

A sensor whose electrical resistance changes with ambient humidity is provided with a protective film of Pt-catalysed siloxane varnish.

Combustible Gas Detector

MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD.

U.S. Patent 4,352,286

The gas sensing body of a combustible gas detector is formed by sintering a mixture of metal Fe, Cu, Zn and/or in oxides, a sulphate and a halide. Two embedded Pt wire electrodes in the sintered body detect changes of resistance indicative of the presence of combustible gases.

Gas Flow Measuring Apparatus

NIPPON SOKEN INC.

U.S. Patent 4,357,830

A sturdy gas flow measuring apparatus, for example for measuring the air flow to an I.C. engine, has one Pt resistance wire temperature sensor wound together with a resistance heating wire on an insulating substrate and a second Pt resistance wire wound on a separate insulating former.

Oxygen Sensor for Use in Heat Treatment Furnace

CORNING GLASS WORKS

U.S. Patent 4,362,580

Conventional solid electrolyte O_2 sensors may be used in gas carburising furnaces when a getter made from the same platinum group metal as that of the electrodes is installed upstream of the sensor. The getter, preferably Pt carried on a honeycomb support, absorbs harmful contaminants present in the furnace atmosphere.

Oxygen Sensor for Use in Automobile Exhaust Gases

DEGUSSA A.G.

U.S. Patent 4,362,605

The performance of a solid electrolyte O_2 sensor used to adjust the air-fuel feed to an I.C. engine in fuel-rich mixtures is improved by wrapping the sensor in a catalyst-containing material. The wrapping, which must not touch the sensor, is preferably a perforated tube carrying a heat-resistant steel gauze which has been coated with a platinum group metal catalyst material, notably Pt-Rh or Pt-Rh-Al.

HETEROGENEOUS CATALYSIS

Prediction of Hydrocarbon Levels in a Marine Oil Field

CHEVRON RESEARCH CO.

British Appl. 2,103,361 A

A method for the in situ collection and examination of small concentrations of CH_4 dissolved in H_2O , which is used to predict hydrocarbon levels lying below the sea-bed, uses a $\text{Pt}/\text{Al}_2\text{O}_3$ catalyst to convert CH_4 to gaseous CO_2 and H_2O .

Preparation of Organic Compounds from Low Hydrogen Synthesis Gas

SHELL INTERNATIONAL RESEARCH Mij.B.V.

British Appl. 2,103,647 A

In a two stage process for preparing hydrocarbons and oxygenic compounds unconverted syngas from the first stage product is converted in a second stage

into paraffins over Ru, Co or Ni catalysts. The H₂:CO molar ratio of the feed for the second stage is adjusted to a required value, say 1.75–2.25, by blending this feed with H₂-rich syngas which is obtained by subjecting a small portion of the feed from the first stage to a high temperature CO-shift.

Crystalline Aluminosilicate Catalysts

BRITISH PETROLEUM P.L.C. *European Appl.* 71,382

New aluminosilicate catalysts having a Si:Al molar ratio >12:1, which have been washed with a solution containing an organic base, carboxylic acid, an alcohol, glycol, phenol or ester to give increased catalyst life, may be ion exchanged prior to washing with a wide variety of catalytically active metals. These metals include Ru, Rh, Pt, Pd and Ir.

Selective Hydrogenation Catalyst

BASF A.G. *European Appl.* 71,787

A catalyst for the partial hydrogenation of olefinic aldehydes and ketones of the corresponding alcohols consists of a C support impregnated with 0.1–1.0% Ru and 0.5–1.5% Fe.

Hydrosilylation Catalysts

IMPERIAL CHEMICAL INDUSTRIES P.L.C. *European Appl.* 73,556

A new catalyst is a mixture of a Pt halide, an unsaturated organosiloxane and an Al alkoxy, such as Pt chloride, divinyl tetramethyl disiloxane and Al isopropoxy. These catalysts give high activity in Si-H compound reactions, such as in release coatings, they are stable in storage and do not corrode metals.

Catalyst for Alcohol-Fuelled I.C. Engines

DEGUSSA A.G. *European Appl.* 75,124

Exhaust gases from I.C. engines using alcohol as fuel tend to have a much higher aldehyde content. These gases may be purified more easily by using a corrugated sheet steel catalyst support coated with Al₂O₃ containing 0.2–20% of a Group 11A or lanthanide oxide or oxides and impregnated with 0.03–3% Pd.

Production of Nitrogen of Very High Purity

LEYBOLD-HERAEUS G.m.b.H. *European Appl.* 75,663

Technical N₂ is further purified by adding H₂ and passing the mixture over a Pt, Pd, Ru or other catalyst so that the H₂ reacts with the O₂ present to form H₂O. The residual O₂ is removed by metallic Cu as Cu oxide.

Catalyst Regeneration

STANDARD OIL CO. (INDIANA) *U.S. Patent* 4,350,615

Small amounts of a Pd-Ru promoter enhance the combustion of CO within the regeneration zone of a catalytic cracking unit without simultaneously causing the formation of excessive amounts of NO_x. The Pd-Ru promoter also enhances the capture of SO_x by suitable absorbents. The ratio of Pd:Ru in the promoter is 0.1–10:1.

Foldable Gauze Pack

JOHNSON MATTHEY P.L.C. *U.S. Patent* 4,351,887

Getter packs for use in NH₃ oxidation plants are formed from a series of segmented gauzes to obtain easy storage and improved ease of installation and removal from the reactor. The segments are, preferably, in the form of a hemisphere or quadrant and are obtained by folding a conventional converter pad. The getter segments are normally made from Au-Pd alloy and are used with Pt-Rh catalyst gauzes.

Rhodium Catalysts for Synthesis Gas Conversion

HOECHST A.G. *U.S. Patent* 4,351,908

The life of Rh catalysts used for the production of acetic acid, acetaldehyde and ethanol from synthesis gas is prolonged, and improved conversion rates are obtained, when the catalyst is heated in steps to its operating temperature of 75–125°C over a period of time from 100–1,000 hours.

Acetaldehyde Production

KURARAY CO. LTD. *U.S. Patent* 4,351,964

Good acetaldehyde yields are obtained from an industrial process in which acetic anhydride is reacted with H₂ in the presence of a Pt, Pd or Rh catalyst under elevated pressure and temperature.

Catalytic Combustion Arrangement for an External Combustion Engine

U.S. SECRETARY OF THE INTERIOR *U.S. Patent* 4,354,352

Catalytic material, especially Pt-Rh alloy, is bonded directly to the heat dome, of a Stirling or steam engine in order to obtain maximum heat exchange. The surface may be finned or otherwise enlarged to provide the increased surface area necessary for heating the engine head. The method provides more efficient catalytic conversion than usual.

Regeneration of Coked Platinum-Based Reforming Catalysts

EXXON RESEARCH & ENGINEERING CO. *U.S. Patent* 4,354,925

The addition of at least 20%, preferably more, of CO₂ instead of conventional N₂-flue gas inert mixtures to a regeneration gas for the reactivation of Pt-based multimetallic reforming catalysts shortens the regeneration time and reduces compression costs. The higher heat capacity of CO₂ permits the use of a higher O₂ content, especially during a primary coke burn.

Palladium-Catalysed Preparation of Primary Aromatic Amines

BASF A.G. *U.S. Patent* 4,355,180

Aromatic amines, especially substituted amines, may be prepared in good yield from the corresponding alicyclic alcohols or ketones, such as cyclohexanol and cyclohexanone, by a one step amination and dehydrogenation process using a supported Pd catalyst which also contains Zn and/or Cd.

Liquid Phase Hydroxycarbonylation of Methanol

BRITISH PETROLEUM CO. *U.S. Patent 4,357,480*

Ethanol may be prepared with excellent selectivity when the hydroxycarbonylation of methanol is carried out in the presence of a soluble methanol homologation catalyst which is either a Co or a Group VIII metal catalyst component used with an iodide or bromide promoter and a particulate solid, such as Al_2O_3 or SiO_2 . The Group VIII catalyst component, such as Pd, Pt or Fe, contains specified substituted cyclopentadiene ligands.

Production of High Octane Hydrocarbon Fractions

INSTITUT FRANCAIS DU PETROLE

U.S. Patent 4,361,422

High octane petroleum cuts are obtained by subjecting a pyrolysis 5C cut to extensive hydrogenation under specified conditions, such as using a Pd or Ni catalyst and then etherifying the hydrogenated fraction with a 1-4C alcohol.

Catalyst for Conversion of Synthesis Gas to Ethanol

ETHYL CORP.

U.S. Patent 4,361,499

Rh and Fe deposited in the reduced state on an Al_2O_3 carrier and used together with a heterocyclic amine promoter, such as pyridine or isoquinoline, is an active catalyst for the selective preparation of ethanol from methanol and synthesis gas.

Oxidation of Methanol

JOHNSON MATTHEY & CO. LTD. *U.S. Patent 4,362,655*

Catalytic metal or alloy bodies made by a melt spin process or by a melt extraction process have enhanced catalytic activity over bodies made by other metallurgical techniques. In particular the method may be used to enhance the activity of Pt-Rh catalysts used for the oxidation of NH_3 in HNO_3 plants, Ag catalysts used for formaldehyde production from methanol and brass spelter catalysts used for the dehydrogenation of isopropanol.

Platinum Group Metal Oxide Catalysts for Chlorine Dioxide Production

DIAMOND SHAMROCK CORP. *U.S. Patent 4,362,707*

ClO_2 may be generated from a mixture of chlorate and acid, such as Na chlorate and H_2SO_4 , using a catalyst system containing a mixture of valve metal oxide and Ru, Ir, Pd, Rh and/or Pt oxide.

Methane Synthesis

INSTITUT FRANCAIS DU PETROLE

French Appl. 2,499,552

The problem of excess heat during the synthesis of CH_4 and other hydrocarbons from synthesis gas in the presence of a Ru catalyst is overcome by distributing the Ru catalyst in a water-based liquid which acts as a heat exchanger. A suitable catalyst is obtained by mixing $RuCl_3$ with a solution of Al_2O_3 .

HOMOGENEOUS CATALYSIS

Synthesis of Unsymmetrical Phosphines

JOHNSON MATTHEY P.L.C. *British Appl. 2,101,601 A*

Biphosphines are produced by preparing a bisphosphonium salt, hydrolysing it to a bisphosphine oxide and then reducing the oxide to the bisphosphine. A typical phosphine is 1-ethylphenylphosphino-6-diphenylphosphinohexane. Unsymmetrical bisphosphines may be used to complex platinum group metals, to form catalysts.

Iridium and Rhodium Phosphine Catalysts

EXXON RESEARCH & ENGINEERING CO.

British Appl. 2,106,122 A

A new homogeneous catalyst particularly useful for olefin hydroformylation is a complex of a Ru, Ir or Co salt and a silyl-substituted alkyl-diaryl phosphine, such as $[(Ph_2PCH_2CH_2)_ySiMe_{4-y}]Ir(CO)H$ where y is 1 or 2.

Homologation of Carboxylic Acids

SHELL INTERNATIONALE RESEARCH Mij. B.V.

European Appl. 72,055

Higher carboxylic acids and esters are obtained by reacting carboxylic acids and ethers with CO and H_2 in the presence of a Ru compound and a second platinum group metal compound, preferably Ru chloride and Rh chloride.

Hydroformylation Catalyst

UNION CARBIDE CORP.

European Appl. 73,961

A new catalyst for olefin hydroformylation is a complex of Rh with a biphosphine monoxide, such as $Ph_2PCH_2P(O)Ph_2$.

Alcohol Production

UNION CARBIDE CORP.

European Appl. 75,937

Ethylene glycol, methanol and other alcohols are produced from CO and H_2 using a solubilised Ru carbonyl and a Rh carbonyl catalyst.

Ruthenium Catalyst for Ethylene Glycol Synthesis

TEXACO INC.

U.S. Patent 4,351,907

Ethylene glycols may be prepared from synthesis gas in good yields using a Ru compound catalyst and polyhydric phenol promoter. The claims have been limited to the production of ethylene glycol ethers in the presence of a Ru compound, a polyhydric phenol and a mineral acid.

Bicyclic Prostaglandin Analogues

IOWA STATE UNIVERSITY RESEARCH FOUNDATION

INC. *U.S. Patent 4,351,949*

The addition of π -allyl Pd compounds to strained bicyclic alkenes and subsequent chain-extension reactions using organopalladium compounds leads to the formation of a large number of bicyclic prostaglandin analogues which are specific inhibitors of thromboxane synthetase.

Preparation of Hydroxytetrahydrofuran

STAMICABRON B.V.

U.S. Patent 4,356,125

An improved method for the hydroformylation of allyl alcohol uses as the hydroformylation catalyst an organic Rh complex dissolved in a ligand-forming complex and supported on a solid porous carrier material. A preferred catalyst is Rh hydridocarbonyltris(triphenylphosphine) in triphenylphosphine.

Bimetallic Catalyst Cluster Compounds

EXXON RESEARCH & ENGINEERING CO.

U.S. Patent 4,360,475

Bimetallic cluster compounds of formula $M_n[(Ru_6C(CO)_{16})_2L]$, where M is a Group IA or IIA metal or other suitable cation and L is Tl, In or Ga, are useful catalysts for the conversion of synthesis gas to organic compounds. A typical catalyst, $[Et_4N][Ru_6C(CO)_{16}]$, was used to obtain lower alcohols.

Production of Ethylene Glycol and Methanol from Synthesis Gas

UNION CARBIDE CORP.

U.S. Patent 4,360,600

The addition of an organosilicon compound, such as a trialkyl silane or a Si derived polymer, to a solubilised Ru carbonyl catalyst enables ethylene glycol and methanol to be obtained from synthesis gas under lower pressure and temperatures than when a Ru catalyst is used by itself.

Multimetallic Catalyst for Hydrocarbon Dehydrocyclisation

U.O.P. INC.

U.S. Patent 4,361,479

A dual-function acidic catalyst for the dehydrocyclisation of 6-10C paraffins to aromatic hydrocarbons consists of a pyrolysed Ru carbonyl component deposited on a carrier containing 0.01-2% of a platinum group metal, especially Pt, 0.01-5% Re and a halogen component.

Alcohol Production from Olefins and Synthesis Gas

STANDARD OIL CO.

U.S. Patent 4,361,711

A one stage, continuous, vapour phase process for producing large quantities of alcohol from olefins and synthesis gas uses a solid oxide catalyst complex having the formula: A_xRhO_x , where A is Fe, Zn, Ir, Ru, Nb, Cr, Mn and/or Pt, a is 0.901-10 and x is less than the number required to satisfy the valency of the other elements. Typical catalysts are $RhZn_{0.6}O_x$ and $RhMn_2O_x$.

Ruthenium-Based Catalyst System for Acid Preparation

TEXACO INC.

U.S. Patent 4,362,822

A selective catalyst system for producing acetic and propionic acid from synthesis gas contains a Ru compound such as RuO_2 , $Ru(acac)_3$ or $Ru(CO)_{12}$ and a halogen-containing Ti or Zr salt dispersed in a low melting quaternary phosphonium or ammonium base or salt, such as Cp_4ZrHCl in a Bu_4PBr melt.

FUEL CELLS

Fuel Cell

HITACHI LTD. AND HITACHI CHEMICAL CO. LTD.

European Appl. 74,111

In a fuel cell using a phosphoric acid electrolyte, the electrodes are separated by a porous matrix which is preferably a mixture of SiC and Zr phosphate. The electrode catalyst is preferably Pt, Pd or Ru.

Porous Electrode for Fuel Cells

ELECTROCHEMISCHE ENERGIECONVERSIE N.V.

U.S. Patent 4,362,790

The amount of noble metal, such as Pt and Pd, used in a fuel cell electrode may be reduced when the electrode has a thin layer (<80 μm thick) of catalyst formed from particles of the catalytic metal, C and a polymeric binder and an underlying layer.

CHEMICAL TECHNOLOGY

Silver Halide Photographic Emulsions

MITSUBISHI PAPER MILLS LTD.

U.S. Patent 4,353,981

The shelf life of photographic emulsions containing soluble Au, Ir and/or Rh salt activators is improved by using a resin-coated web as a support layer. The web is formed from a mixture of two different natural paper pulps.

Conductive Fabrics

BAYER A.G.

German Offen. 3,117,247

Electrically heatable fabrics are obtained by immersing a textile material in an organic solution of an organometallic complex (preferably of Pd or Pt), drying, and then immersing in an electroless Ni or Cu plating bath.

GLASS TECHNOLOGY

Glass Fibre Drawing

NITTO BOSEKI CO. LTD.

British Appl. 2,102,787 A

A design of orifice plate has a large number of orifices arranged in a flooding relationship. The plate is made from Pt-Rh or Pt-Au-Pd alloy.

Laminates for Handling Molten Glass

OWENS-CORNING FIBERGLAS CORP.

British Appl. 2,103,135 A

Platinum group metals may be satisfactorily bonded to refractory metals by means of hot isostatic pressure. The laminates, of two 15 μm Pt base alloy sheets and a 30 μm Mo alloy sheet, are particularly used for feeding glass in fibre production.

Z.G.S.-Pd Sandwich

JOHNSON MATTHEY P.L.C.

European Appl. 74,277

Fibre glass bushings for use in the glass industry are cheaper but just as robust when they are made of two or more contiguous zones of dissimilar noble metals

or their alloys bonded together at their interface or interfaces. A preferred composite is a dispersion strengthened Pt-Pd alloy sandwiched between dispersion strengthened Pt. These may replace the more expensive Pt-Rh alloys used in the glass industry.

ELECTRICAL AND ELECTRONIC ENGINEERING

Thick Film Resistor Compositions

E. I. DU PONT DE NEMOURS & CO. *European Appl.* 71,190
Use of Mn vanadate T.C.R. drivers in Ru-based resistor compositions allows the required T.C.R. to be obtained without excessively raising their resistivity. The compositions contain 4-75% Ru-based material, preferably RuO₂, 96-25% glass frit and 0.05-15% of a Mn vanadate of formula Mn_aV₂O_b, where a is 1-2 and b is 6-7, optionally partially substituted by Y, Th, In, Cd, Pb and/or lanthanide metals.

Thick Film Conductor Compositions

E. I. DU PONT DE NEMOURS & CO. *European Appl.* 71,928

Conductive elements of improved stability are obtained by screen printing and firing on a non-conductive ceramic substrate a paste of 5-50% finely divided, Bi-free, low-melting, low-viscosity, preferably devitrifiable glass and 50-95% of a mixture containing 6-60% finely divided Pd and 40-94% finely divided Ag.

Thick Film Conductors

ELECTRO MATERIAL CORP. OF AMERICA *U.S. Patent* 4,350,618

Thermal runaway in microelectronic packages may be reduced by increasing the surface area of the Pd component of a thick film Pd/Au conductor and by increasing the particle size of the Au component. The conductor composition contains 87.88% Au, 1.41% Pd, 0.43% Pt and 1.41% ZnO together with Bi₂O₃ and glass frit.

Lift-Off Method for Semiconductor Manufacture

U.S. PHILIPS CORP. *U.S. Patent* 4,353,935
Attack on an Al conductive track, during subsequent masking and etching, is avoided by covering the whole surface with a further conductive layer, made of a platinum group metal or Re, before masking. This layer is subsequently removed with the masks.

Solar Cell

U.S. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION *U.S. Patent* 4,355,196

Two separate processes are used to form black surface reflectors and metallised contacts on an ultra-thin solar cell in order to obtain both good ohmic contact and improved heat dissipation. The electrodes are preferably of Ti-Pd-Ag or Pd-Ni-Cu and the reflective surface of Au, Ag, Cu or Al.

Platinum-Cadmium Sulphide Schottky Barrier Photodiode

GENERAL DYNAMICS, POMONA DIVISION *U.S. Patent* 4,355,456

A photovoltaic detector designed to operate on near u.v. and short wave visible radiation, which has very little response to wavelengths longer than 5200Å, has both ohmic and barrier contacts located on the same side of a Cd sulphide substrate to facilitate wire attachment by high speed bonding techniques. A Ti-Au-Ti i.r. shield structure is deposited on to the substrate and also provides connection between the contacts, and a Pt layer deposited on a small central optically active area provides the barrier layer.

Thick Film Resistors for Use in Weighing Machines

GENERAL ELECTRIC CO. *U.S. Patent* 4,355,692
Thick film strain gauges affixed to a flexible metal substrate via an insulating layer, are used to produce highly accurate "bathroom scales". Preferred thick film frit compositions contain RuO₂ or Bi ruthenate.

Alloyed Metal Contact Layers for Semiconductor Devices

SIEMENS A.G. *U.S. Patent* 4,359,486

A region of a semiconductor surface intended for metal contact is scanned with a closely packed sequence of intense laser light pulses to generate a disturbed surface layer and a metal layer is then deposited on and alloyed with the semiconductor surface to produce a contact area. This method is especially useful for applying Al and silicide layers, such as Pd and Pt silicide, to Si substrates.

TEMPERATURE MEASUREMENT

Carbide Thin Film Thermistor

MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD. *U.S. Patent* 4,359,372

Highly reliable thermistors having good temperature stability over a wide range of temperatures are obtained by sputtering a carbide resistor film over Ag-Pd, Au-Pt, Ag or Au conductors fired on an Al₂O₃ substrate. A desired resistance may be obtained by controlling the amount and type of impurity gas used in the sputtering process.

MEDICAL USES

Palladium-Silver Dental Alloy

J. M. NEY CO. *U.S. Patent* 4,350,526
An alloy containing 45-60% Pd, 25-45% Ag, 3-15% Sn and/or In, 0.3-9% Zn, 0.1-1% Si, up to 5% of Cu, Mg, Ga and/or Ru and up to 0.25% Re and/or Ir bonds well to dental porcelain without discolouring the porcelain during the firing process. A preferred alloy contains 55% Pd, 35% Ag, 9% Sn, Zn and Si.