

# NEW PATENTS

## METALS AND ALLOYS

### Clad Bonding Wire for Semiconductor Device

TANAKA DENSHI KOGYO *British Appl. 2,248,416A*  
Wire comprises a cladding of Pd, Pt, Au or Ag, or their alloys, and a core of Pd, Pt, Au or Ag, or their alloys, which are different from the cladding. The ratio of diameter of the core to outer diameter of the cladding is preferably 15–60% or 85–99%. The wire can form a neck portion of strength equal to or higher than other portions and can form a ball which does not crack the semiconductor package.

### Hydrogen Storage Nickel-Zirconium Alloy for Batteries

MITSUBISHI MATERIALS K.K.

*Japanese Appls. 4/66,632–633*

Alloy compositions comprise by wt. %: (a) 10–37 Zr, 5–30 Ti, 5–30 Mn, 1–30 Fe, 0.001–0.5 Pt or Au, 0.01–15 W, Ni, and (b) 10–37 Zr, 5–25 Ti, 4–20 Mn, 0.01–15 Fe, 0.001–0.5 Pt or Au, 0.1–15 V, balance Ni and impurities, both having a MgZn<sub>2</sub> type crystal structure. The alloys are used for anode active substances in batteries, have reduced self discharging and large discharge capacity for a long cycle life.

## ELECTRODEPOSITION AND SURFACE COATINGS

### Soluble Perhydrosiloxane Copolymers for Coating Compositions

R. H. BANEY

*U.S. Patent 5,091,162*

Perhydrosiloxane copolymers are dissolved in a solvent (2), the solution optionally including a Pt or Rh catalyst at 5–500 ppm with respect to the perhydrosiloxane and a modifying ceramic oxide precursor (1) sufficient to provide 0.1–30 wt. % of (1) in a formed ceramic coating. The ceramic coating is formed by coating the substrate with a solution of the copolymer and (2), evaporating (2), heating the coating at 20–1000°C in an ammonia or amine atmosphere. The resulting coating has low defect density, and is used in electronic devices.

### Catalyst for Electroless Plating

HITACHI CHEMICAL K.K. *Japanese Appl. 4/26,774*

The catalyst is obtained by mixing a divalent Pd compound and at least two lower alkylamines with a 1:1 to 1:10 molar ratio of Pd compound to total amount of lower alkylamine, into a buffer solution comprising 0.001–0.5 mol/l of Na citrate and of NaOH. Electroless plating is performed by degreasing an insulation material, dipping it into the catalyst, rinsing with H<sub>2</sub>O and dipping it into an aqueous solution of reducing agent, rinsing, followed by electroless plating. High-density multilayer printed circuit boards are produced by this process.

### Composite Laser Plating

MITSUBISHI HEAVY IND. K.K. *Japanese Appl. 4/26,791*

A composite laser plating of improved performance is obtained by immersing a Pt anode and workpiece in a plating solution containing ions and irradiating it with a variable wavelength laser beam from a laser oscillator outside the vessel. The simple plating procedure gives desirable composite electroplating.

### Pt-W Alloy Electroplating Bath

TANAKA KIKINZOKU KOGYO *Japanese Appl. 4/32,595*

The bath contains a Pt compound and tungstic acid and/or a tungstate and has a pH of  $\geq 3$ . Pt-W alloy objects are electroplated in the electroplating bath by applying a current density of 0.025–3.0 A/dm<sup>2</sup>. Preferably, the plated alloy film is amorphous. The Pt compound is Pt chloride, chloroplatinic acid, a chloroplatinate, Pt hydroxide, a hydroxy-platinate, Pt dinitrodiamino complex salt and/or Pt dinitrosulphido complex salt. A Pt alloy plated film with high corrosion resistance, even to aqua regia, is produced.

## APPARATUS AND TECHNIQUE

### Electrode for Measuring pH

TOA ELECTRONICS K.K. *European Appl. 472,398A*

A measuring electrode comprises an electrically conductive support of Pt, Al, Ta, etc., covered with an insulating film of Al<sub>2</sub>O<sub>3</sub>, Ta<sub>2</sub>O<sub>5</sub>, Si<sub>3</sub>N<sub>4</sub>, etc., and a coating of a sensitive Ir, Pt, Pd, Rh or Sn oxide film on the exposed region, with the O:Ir ratio being 2.5–3.5. The electrode is used in small devices, is durable, stable and effective for pH 0–14, with a quick response.

### Oxygen Sensor for Measuring Exhaust Gas Composition

JAPAN ELTRN. CONTROL SYST.

*Japanese Appl. 4/19,555*

The sensor consists of a heat-resistant ZrO<sub>2</sub> tube, a pair of Pt electrodes attached to the inner and outer surfaces of the tube and a housing connected to the tube. The sensor, which has a high heat resistance, is produced by high temperature, of at least 1000°C, and high pressure (10–1000 atm) conjugation. The sensor is used mainly for measuring the O<sub>2</sub> concentration of exhaust gases from car engines.

### Oxygen Concentration Sensor

JAPAN ELTRN. CONTROL SYST.

*Japanese Appls. 4/25,754–55*

A sensor has a ZrO<sub>2</sub> tube containing internal and external Pt film electrodes and a protection layer generating voltage with respect to the O<sub>2</sub> concentration. The sensor can also comprise an outermost layer of a metal oxide which is stable at high temperature and Pt black. The sensor is used to purify the exhaust of motor cars by keeping a proper air:fuel ratio.

### Deoxidiser for Preservation of Foods

MITSUBISHI GAS CHEM. K.K. *Japanese Appl.* 4/61,931

A deoxidiser comprises an organic compound with an OH group and a Pt group metal catalyst, preferably Pt/C. Preferred compounds having the OH group are methanol, ethanol, glycerine, ethylene glycol, especially ethanol glycerine. The deoxidiser can be used to preserve foods, in medicines, clothes and electronic devices.

### Gas Sensor to Detect Hydrogen Sulphide or Ammonia

TOTO K.K. *Japanese Appl.* 4/62,466

A gas sensor comprises a solid-state electrode of LaF<sub>3</sub>, a reference electrode of Sn + SnF<sub>2</sub> or Au, and a detection electrode of Pt, Pd or Ir. Atmospheric gas, containing H<sub>2</sub>S and NH<sub>3</sub>, in contact with the interface between the detection electrode and LaF<sub>3</sub>, causes changes in ion activity near the interface. The potential between the detection and reference electrodes changes thus giving the response signals. The gases can be detected at room temperature.

## JOINING

### Fluxless Soldering Method

MOTOROLA INC. *U.S. Patent* 5,086,966

Soldering to metallic substrates can be performed by contacting the substrate with a Pd-Sn alloy solder and heating to re-flow the solder onto the substrate. Pd is deposited onto the solder body surface prior to heating the solder alloy in contact with the substrate to enhance wetting the substrate and bonding.

## HETEROGENEOUS CATALYSIS

### Catalysts for Converting *n*-Butane to Isobutene

ENIRICERCHES P.A. *British Appl.* 2,246,524A

Catalysts for the production of isobutene by dehydroisomerisation of *n*-butane comprise 0.1–1 wt.% Pt/SiO<sub>2</sub> deposited on the surface of a porous granular  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> support of surface area 100–400 m<sup>2</sup>/g, pore volume 0.5–1.5 cm<sup>3</sup>/g and particle size 0.4–5 mm. The catalyst also contains 0.1–1% In and/or 0.05–1% Sn. The Pt:In wt. ratio is 0.3–1.5:1, while the Pt:Sn is 0.5–2.1.

### Paraffin Oxidation with Hydrogen/Oxygen Mixture

ENIRICERCHES P.A. *European Appl.* 469,662A

Oxidation of paraffinic compounds into corresponding alcoholic and/or ketonic derivatives comprises reacting the paraffins with a mixture of O<sub>2</sub> and H<sub>2</sub> at 0–100°C, in the presence of Pt, Pd, Rh, Ru or Ir catalysts and Ti silicalite, in a medium acidified by a mineral or organic acid. The zeolitic type catalyst allows low temperature oxidation of paraffins, which are generally unreactive, with a H<sub>2</sub> and O<sub>2</sub> mixture.

### Automobile Monolithic Converter for Alcohol-Containing Fuel

GENERAL MOTORS CORP. *European Appl.* 470,653A

The converter contains Pd deposited onto a surface of a ceramic honeycomb monolith in exhaust gas upstream of a Pt-Rh-impregnated monolith having a uniform loading of catalyst material on a surface. The converter for alcohol-containing fuel applications minimises the formation of aldehydes, in that the catalytic converter is characterised by a rapid heat-up period and corresponding lower light-off time.

### Production of Trifluoroethylene

JAPAN HALON CO. LTD. *European Appl.* 471,320A

Trifluoroethylene (TFE) is produced by reacting 1,1,2-trichloro-1,2,2-trifluoroethane with H<sub>2</sub> in the presence of a catalyst comprising Pd and at least one other active catalyst component of Au, Te, Sb, Bi or As. The catalysts can be also supported on an inert carrier. In an example, a catalyst comprised 1 wt.% Pd–0.2 wt.% As/active C. The TFE can be produced in a one-step reaction and the catalyst has high activity and a long life.

### Regenerating Deactivated Hydrogenation Catalysts

HULS A.G. *European Appl.* 472,853A

The process involves subjecting deactivated hydrogenation catalysts, especially Ru/Al<sub>2</sub>O<sub>3</sub>, to ultrasonic treatment outside an hydrogenator in an ultrasonic bath, or with a source of ultrasound inside the reactor. The source has a frequency 18–50 kHz and output 10–100 W/cm<sup>2</sup>.

### Integrated Process for Methyltertalkyl Ether Production

PHILLIPS PETROLEUM CO. *European Appl.* 474,188A

An integrated process for producing tertiary alkyl ether compounds, with simultaneous iso-olefin and ether production, by reacting the produced iso-olefin with a primary alcohol under etherification conditions comprises simultaneous hydrogenation and dehydrogenation in the presence of a supported platinum group metal catalyst. The process can convert low octane, high Reid vapour pressure hydrocarbons to high octane, low Reid vapour pressure organic compounds, with high conversion and selectivity.

### Production of High Purity Aniline

MITSUMI TOATSU CHEM. INC.

*European Appl.* 476,404A

Continuous production of aniline is effected by hydrogenating nitrobenzene in the presence of a catalyst and a Zn compound promoter at 150–250°C using H<sub>2</sub> containing 1–500 ppm CO. The catalyst comprises Pd and optionally Pt on a lipophilic C support with an oil absorbency of  $\geq 100$ . The produced aniline contains < 50 ppm of nitrobenzene and is thus suitable for direct conversion to methylenedianiline.

### Preparation of Halogenated-Alkyl-Ferrocenes

POUDRES & EXPLOSIFS *European Appl.* 478,417A

Monohalogenoalkyl ferrocene is prepared by the reduction of a monohalogenoalkanoyl-ferrocene in acetic acid using  $\text{PtO}_2/\text{SnCl}_2$  catalyst. This method has a very high yield of > 90%, and can be scaled up simply and cheaply, and gives a very pure raw product (95%) in a good time. The  $\text{H}_2$  pressure is increased to 500kPa during the reaction.

### Removal of Organochlorine Compounds from Combustion Exhaust Gas

NKK CORP. *World Appl.* 92/4,104A

Organochlorine compounds are decomposed from combustion exhaust gas by contacting with a catalyst containing at least one of Pt, Pd, Ru, Mn, Cu, Cr, Fe and their oxides supported on a carrier containing  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$  and  $\text{TiO}_2$ , at 150–350°C. The carrier has a honeycomb structure and can be pellets. The space rate of the exhaust gas lies between 1,000–50,000/h. The method is carried out using catalysts without heating, and is highly efficient and stable for a prolonged time.

### Methylpyridine Preparation

STANDARD OIL CO. OHIO *U.S. Patent* 5,066,809

3-Methylpyridine is produced by contacting 2-methylglutaronitrile with  $\text{H}_2$  and a solid catalyst containing Pd promoted with at least one of Cr, W, Ni, Co and Ge on a support, preferably of 0–30 wt.%  $\text{SiO}_2$  and 100–70 wt.%  $\text{Al}_2\text{O}_3$ . In an example, the support is impregnated with a solution containing  $\text{PdCl}_2$  in HCl and  $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$  in water. The catalyst gives high yields, of 78% production at 100% conversion.

### Synthesis Gas Production from Hydrocarbons

EASTMAN KODAK CO. *U.S. Patent* 5,068,057

Production of synthesis gas with  $\text{H}_2$ :CO molar ratio of 1:1.5 to 2:1 is effected by contacting an anhydrous mixture of  $\text{CO}_2$  and one or more HCs with a fixed bed of a catalyst comprising Pt or Pd on  $\text{Al}_2\text{O}_3$  or  $\text{SiO}_2/\text{Al}_2\text{O}_3$ , at 650–1000°C and GHSV of 100–50,000. The process gives higher  $\text{CO}:\text{H}_2$  ratios than conventional steam reforming, and is suitable for applications such as hydroformylation or carbonylation. The reaction proceeds smoothly with no apparent loss of catalyst activity.

### Reducing Pollution from Combustion Chamber

B. J. ROBINSON *U.S. Patent* 5,085,841

The method comprises injecting homogeneously to the flame zone of a combustion chamber a mixture of Pt, Rh or Re containing, in mg, 1–9 Pt, 0.2–3 Rh and 0.3–3 Re. The mixture is carried by gases into the flame zone during fuel combustion for simultaneously enhancing oxidation of C in the fuel and inhibiting oxidation of  $\text{N}_2$  in the air. The method is of use in diesel and petrol engines, and in engines or furnaces where combustion of gaseous, liquid or solid fuels takes place.

### Catalytic Dehydrogenation of Propane or Butane

UOP *U.S. Patent* 5,087,792

Propane or butane is dehydrogenated in the presence of a Pt catalyst on a support. The process is carried out under severe conditions which promote rapid deactivation of the catalyst, including agglomeration of the Pt and deposition of coke. The supported Pt catalyst is reactivated by contacting with heated  $\text{O}_2$ -containing gas to remove coke by combustion, with drying gas at 800–1100°F to reduce  $\text{H}_2\text{O}$  content, with Cl to redisperse the Pt, and reduced by contact with H-rich gas. The reconditioned catalyst is recovered from the reduction zone.

### Preparation of Carboxy-Imidazole Active Metabolite

MERCK & CO. INC. *U.S. Patent* 5,089,626

A carboxy-imidazole compound metabolite of angiotensin-II antagonist is prepared by reacting pro-drug hydroxymethyl-imidazole compound by single stage oxidation in an aqueous base reaction medium with an oxidising agent selected from  $\text{K}_2\text{S}_2\text{O}_8$ , NaOCl, NaOBr, NaIO, and  $\text{KIO}_4$ , in the presence of a Ru catalyst. The catalyst may be hydrated  $\text{RuX}_3$  (X = Cl, Br or I) or  $\text{RuO}_4$ , Ru metal powder, Ru/C, Ru (III) a ethylacetone or  $\text{Ru}/\text{Al}_2\text{O}_3$  and is used in amount 0.1–20 mol %. The reaction temperature is in the range of –20 to +50°C and the pH 13–14.

### High Temperature Combustion Catalyst with Extended Life

BABCOCK-HITACHI K.K. *Japanese Appl.* 4/27,433

The catalyst consists of a refractory inorganic support loaded with Pd oxide and a double oxide of Pd and La, of atomic ratio La:Pd 0.01–0.4/1. In the production of the catalyst, Pd is loaded onto the support, such as  $\text{Al}_2\text{O}_3$ , and fired; then a La compound is loaded onto the support and fired at 800–900°C in an oxidative atmosphere. The catalyst is used for high temperature combustion.

### Decomposition of Methane Gas

MITSUBISHI HEAVY IND. K.K. *Japanese Appl.* 4/29,744

Decomposition of  $\text{CH}_4$  gas in enclosed spaces, such as submarines, comprises thermally decomposing  $\text{CH}_4$  in the presence of a supported Ru catalyst, such as  $\text{Al}_2\text{O}_3$ .  $\text{CH}_4$  gas can be decomposed efficiently at lower temperatures than by the conventional method, resulting in reduction in cost and size.

### Acid Rain Nuclear Reactor System

B. LIBER *Canadian Patent* 2,018,022

A reactor system has a Rh plus Pt catalytic means to remove flue gas contaminants, preferably in 2 stages. The first stage comprises a plurality of spaced-apart reactor surfaces of Pt and Rh and the second stage contains a catalyst of Co, Ni, Zr and activated charcoal to convert residual contaminants. The system can be used in hetero or homogeneous catalysis.

## HOMOGENEOUS CATALYSIS

### Rhodium Hydroformylation Catalyst

BASF A.G. *European Appl.* 472,071A

A Rh hydroformylation catalyst, with bis-phosphite ligands, and containing divalent bisarylene, optionally substituted alkylene or *o*-arylene and divalent arylene, are claimed, together with the hydroformylation of 2–20C olefins using these catalysts. The catalysts show high activity and great hydrolysis resistance, have low volatility and allow easy separation of the catalyst from the volatile hydroformylation products. The catalysts are used in the hydroformylation of  $\alpha$  and internal olefins to give various aldehydes.

### Selective Preparation of Adipic Acid

RHODE POULENC CHIM. *European Appl.* 477,112A

Adipic acid is prepared by reacting  $H_2O$  and CO with one pentenoic acid in the presence of a Rh based catalyst and an iodine promoter at 100–240°C. The reaction is carried out in the presence of a saturated aliphatic or aromatic carboxylic acid with  $\leq 20C$ , and partial CO pressure at 25°C of  $\leq 20$  bar. The reaction is highly selective for adipic acid production.

### Fragrance Agent Production

HOECHST A.G. *European Appl.* 477,747A

Fragrant agents are prepared from sassafras oil by hydroformylation with CO and  $H_2$  at 5–50 MPa and 70–170°C in the presence of Rh carbonyl complex compounds with triphenyl phosphane as ligand, with excess triphenyl phosphane as catalyst, followed by separation of the reaction product from solvent and catalyst. The process is easily carried out and gives high yields of fragrance compositions, useful for perfuming bulk goods.

### Synthesis of Heterocyclic Compounds

EASTMAN KODAK CO. *European Appl.* 479,161A

2-Aryl-benz(ox, imid, thio) azoles are prepared by condensing an aromatic halide with an orthoamine (phenol, aniline, thiophenol) in the presence of CO and a Pd catalyst, preferably  $PdCl_2L_2$ , and causing the intermediate formed to undergo ring closure to give the desired heterocycle. The formed compounds are useful as anaesthetics, analgesics, virus inhibitors, etc. The method is tolerant of a wide variety of functional groups on either aromatic ring and gives high product yields.

### Phosphino-Binaphthyl Catalysts

TAKASAGO INT. CORP. *European Appl.* 479,542A

2,2'-Bis(diphenylphosphino)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl and its transition metal complexes preferably with Rh, Ru or Ir are claimed. Their intermediates with halo, halogenated Mg or  $P(=O)Ph_2$  are also claimed. The catalysts are useful in various enantioselective syntheses, such as of 2-(N-acylamino)methyl-3-oxo butanoic acid ester.

### 1,2-Epoxybutane Preparation

EASTMAN KODAK CO. *U.S. Patent* 5,077,418

The preparation of 1,2-epoxybutane involves the hydrogenation of 3,4-epoxy-1-butene in the presence of 0.5–5% Rh/C catalyst at 25–80°C and 2–56 bar pressure. Rh or Rh compounds supported on C,  $Al_2O_3$ ,  $SiO_2$ ,  $TiO_2$ , kieselguhr, molecular sieves and zeolite may be used as the catalyst. An inert organic solvent may optionally be present with further hydrogenation over a Ni catalyst to remove any butyraldehyde produced. Epoxyalkanes are useful in the manufacture of polyethers, alkyne glycols, and stabilisers for chlorinated hydrocarbons, etc.

### Methyl Methacrylate Preparation

SHELL OIL CO. *U.S. Patent* 5,081,286

Methyl methacrylate is prepared by contacting treated propyne feed with  $CO_2$  and  $CH_3OH$  in the presence of a Pd carboxylation catalyst. The carboxylation catalyst comprises a Group VIII metal compound, a ligand and a Bronsted acid anion. Preferably, the propyne feed comprises 99% (mass) of propyne. The process provides low-priced propyne feed.

### Alk-1-enyl Ether Cyclocarbonate Preparation

ISP INVESTMENTS INC. *U.S. Patent* 5,095,124

Alk-1-enyl ether cyclocarbonates are prepared from an alk-2-enyl glycidyl ether in the presence of 0.001–1 wt.% of a Ru, Rh or Pd isomerisation catalyst at 100–180°C and a pressure of 1 atm to 50 psig to produce a catalyst and an alk-1-enyl glycidyl ether mixture as an intermediate product. The mixture is further reacted with  $CO_2$  in the presence of a halogen-containing phase transfer catalyst at 100–150°C to give the desired cyclocarbonates. The isomerisation catalyst is preferably Ru chloride hydrate and the phase transfer catalyst is  $Bu_4NBr$ .

### Preparation of Fluorine Containing Dimethylchlorosilanes

SHINETSU CHEM. IND. K.K. *Japanese Appl.* 4/59,782

Preparing F-containing dimethylchlorosilanes which have F-containing groups with dimethylchlorosilane comprises reacting ethylenic compounds in the presence of Rh complexes. In an example,  $C_4F_7CH=CH_2$  and  $(RhCl)(PPh_3)_3$  catalyst were mixed in an autoclave and heated at 100°C for 4 min to give  $C_4F_7CH_2CH_2Si(CH_3)_2Cl$  in 93% yield.

## FUEL CELLS

### Electrocatalyst of Platinum Quaternary Alloy on Conductive Carrier

NE CHEMCAT CORP. *European Appl.* 469,514A

An electrocatalyst comprises a conductive carrier and a dispersed alloy of (in at.%): 40–70% Pt, 9–27% Co, 9–27% Ni and 9–27% Cu. The alloy is preferably a solid solution with a cubic ordered structure. The electrocatalyst has improved activity and life, and is used in an electrode for an acid electrolyte fuel cell.

## Fuel Cell Using Alcohol Fuel

PHYSICAL SCI. INC. *World Appl.* 92/2,965A  
Electricity is generated in a small fuel cell by contacting a lower primary alkanol with an anode and oxidising reducible gas is reduced at the cathode. One face of the anode includes, as an electrocatalyst, a particulate Au-Pt alloy of crystalline nature with a major amount of exposed crystalline faces or facets. Electricity is generated on-site, and poisoning by intermediate is avoided or minimised.

## CHEMICAL TECHNOLOGY

### Preparation of Platinum Group Metals from Feedstock

JOHNSON MATTHEY P.L.C. *British Appl.* 2,247,888A  
One or more of the platinum group metals Rh, Ir, Ru and Os are prepared from a feedstock solution by mixing a polyamine having  $\geq 3$  amino N atoms with a feedstock solution of the chloride complex of the desired metal(s) in oxidation state (III), in the presence of a protonating agent for the polyamine, followed by their recovery. The process is especially useful for the recovery of Rh.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Magnetic Thin Film Recording Medium

KOMAG INC. *European Appl.* 479,232A  
Magnetic thin film recording medium for horizontal recording comprises a substrate and a vacuum deposited magnetic alloy layer containing, in at.%, 8–15 Pt, 5–10 Ni, 3–8 Cr, and  $\leq 75$  Co. Thin film magnetic discs are formed on an Al alloy substrate and a magnetic layer is formed by sputtering. The alloy has a high coercivity, good resistance to corrosion and good noise performance.

### Thick-Film Low-End Resistor Composition

DU PONT DE NEMOURS CO. *U.S. Patent* 5,096,619  
Thick film resistors of resistance  $< 100 \Omega/\text{sq}$ , are formed from Pd, Ag or a Ag alloy having a Pd:Ag weight ratio of 32:68 or 58:42; 40–80 vol.% on total particle solids of a mixture of 0.2–5. wt.% non-crystallising glass of softening points 100–500°C and 150–650°C; 5–20 vol.% uncoated sub $\mu\text{m}$  size of RuO<sub>2</sub>; and an organic medium. The composition has a dense, low porosity stable microstructure, and is used as a laser trimmable chip resistor.

### Thick Film Conductor Composition

SHOWA DENKO K.K. *Japanese Appl.* 4/71,106  
A thick film conductor composition comprises an inorganic component of Ag fine powder, 1–30 wt.% (to the solid component) Pd powder, 1–10 wt.% combined Ag-Cu fine powder, 1–10 wt.% of Bi oxide, and 1–10 wt.% glass powder, an organic vehicle and hydroquinone. The conductor composition is used for chip resistors and hybrid ICs.

## TEMPERATURE MEASUREMENT

### Thermocouple Assembly for Metallurgical Vessel

VERSVIUS CRUCIBLE CO. *U.S. Patent* 5,071,258  
A thermocouple assembly for sensing the temperature of molten metals in a metallurgical vessel, such as a tundish used in a continuous steel casting, includes a double bore insulator containing the 2 noble metal alloy lead wires, preferably Pt-Rh, to avoid e.m.f. drift. High purity Al<sub>2</sub>O<sub>3</sub> powder is preferably packed around an upper annular space between the bore of the Mo sheath and the refractory sheath to prevent diffusion of O<sub>2</sub> within the Mo bore and minimises the formation of gaseous Mo oxide.

### Resistor with Required Temperature Coefficient for Resistance Thermometer

HERAEUS SENSOR G.m.b.H. *German Appl.* 4,026,061  
An electrical measuring resistor for a resistance thermometer, comprises a thin Pt film vapour deposited or sputtered onto a substrate. A layer of Pt resinate and Rh sulpho-resinate is applied by screen printing, with the preparation having a Rh content such that a uniform distribution of 0.01–10 wt.% Rh is present in the resistor layer after drying, firing and heat treatment at 1000–1400°C. The desired temperature coefficient can be obtained at 1600–3860 ppm/K.

## MEDICAL USES

### Dental Porcelains and Alloy

ELEPHANT EDELMETAAL *European Appl.* 475,528A  
A dental alloy used to make a substructure of a dental restoration and a dental porcelain for coating the substructure contains in wt.%, 40–80 Au, 15–50 Ag, 0–20 Pd+Pt, and 0.05 Ir, 0.5–2.0 Zn, 0–1.0 Sn and 0–0.5 Ta. If both Pd and Pt are present one of them is  $< 4$  wt.%. The dental porcelain contains at least three different glass compositions. The alloy and the porcelain have a thermal expansion coefficient of  $> 14.5 \mu\text{m}/\text{m}^\circ\text{C}$  at 20–500°C.

### Platinum Complexes for Diagnosing Infections

RIJKSUNIV. LEIDEN *World Appl.* 92/1,699A  
Square planar Pt<sup>2+</sup> and octahedral Pt<sup>4+</sup> complexes having optionally interconnected ligands, where at least one is labile (L1) and at least one is a detectable marker ligand (L2) are produced for diagnosing infections and genetic deviations. The labile ligand is Me<sub>2</sub>SO, Cl or H<sub>2</sub>O, and L2 is a fluorescent ligand, especially derived from fluorescein or tetramethyl rhodamine. The complexes are useful for labelling nucleic acids, for production of labelled hybridisation probes for detecting viruses, bacteria, parasites, genetic deviations or gene expression.

The New Patents abstracts have been prepared from material published by Derwent Publications Limited.