

ELECTRICAL AND ELECTRONIC ENGINEERING

Semiconductors Produced by Doping Oxide-glasses with Ir, Pd, Rh or Ru

C. C. SARTAIN, W. D. RYDEN and A. W. LAWSON, *J. Non-crystalline Solids*, 1970, **4**, 231

Semiconductors were produced by diffusion doping oxide glasses with more than 1 wt.% of Ir, Pd, or Ru and by implanting 40 keV Ir ions into several oxide glasses. The properties and methods of conduction in the semiconductors is discussed.

TEMPERATURE MEASUREMENT

New Reference Tables for Platinum 10% Rhodium/Platinum and Platinum 13% Rhodium/Platinum Thermocouples - An Interim Report

R. E. BEDFORD, *I.S.A. Trans.*, 1970, **9**, (3), 248-253
Existing reference tables for Pt:10%Rh-Pt and Pt:13%Rh-Pt thermocouples are known to be partially inaccurate and are being revised jointly by the NBS, NPL and NRC (Canada). Details are given of the progress to date and some of the results are presented and discussed.

Selection of Thermocouples for Temperature Profiling of Semiconductor Diffusion Furnaces

I. O. NIELSON, *Solid State Technol.*, 1970, **13**, (10), 33-38, 55

Pt:13%Rh-Pt thermocouples are discussed in terms of their best characteristics for temperature profiling. The criteria for selection, care of the thermocouples, evaluation of the materials and the calibration are all discussed.

Noncatalytic Coating for Platinum-Rhodium Thermocouples

J. H. KENT, *Combust. Flame*, 1970, **14**, (2), 279-281
A mixture of Y oxide and Be oxide (10-15%) gave a good noncatalytic coating for Pt-Rh thermocouples. A series of thin coats of a solution of 6-8% Be oxide in a solution of YCl in HCl was applied to give a coating ≈ 0.015 mm on 0.12 mm wire, after firing at 1600°C.

Measurement of Temperature in Corrosive Melts

V. E. PERFILOVA, S. V. BODYACHEVSKII, L. A. AVVAKUMOVA and A. S. DERMAN, *Izv. Akad. Nauk S.S.S.R., Ser. Fiz.*, 1970, **34**, (6), 1203-1205

A Pt-clad Rh-Pt thermocouple is superior to refractory-clad Rh-Pt thermocouples at 900-1400°C in BaO-B₂O₃ and PbO-PbF₂-B₂O₃ melts.

NEW PATENTS

METALS AND ALLOYS

Gold-based Spinnerette Alloy

JOHNSON, MATTHEY & CO. LTD.

U.S. Patent 3,529,959

A gold-based spinnerette alloy contains between 50% and 80% Au, between 0.04 and 0.5% Ir and the remaining part Pt, apart from the impurities. A method of making the alloy consists of induction melting the components, casting a sheet and homogenising.

CHEMICAL COMPOUNDS

Osmium Carbonyl

JOHNSON, MATTHEY & CO. LTD.

U.S. Patent 3,508,870

Method of preparing Os carbonyls is described. A solution of OsO₄ in an inert hydrocarbon solvent is heated to an elevated temperature under super-atmospheric pressure in the presence of CO. The product is primarily Os₃(CO)₁₂ with traces of Os₄O₄(CO)₁₂.

ELECTRODEPOSITION AND SURFACE COATINGS

Coating or Inlaying

JOHNSON, MATTHEY & CO. LTD.

British Patent 1,207,970

A Cu or Cu alloy is coated or inlaid with a thin layer of a noble metal such as Au, Ag, Pd or Pt or alloys thereof by interposing between the two a layer of Ni, Fe, Co, Mo, or V, and heating the three layers under pressure to bond them.

Reductive Vapour Deposition of Osmium

ENGLISH ELECTRIC VALVE CO. LTD.

British Patent 1,209,318

High purity Os deposits are obtained on a surface by vapour deposition from an OsO₄/H₂ mixture. OsO₄ is dissolved in water at room temperature and H₂ (or a gas containing H₂) bubbled through the solution. The resulting gas is mixed with another reducing gas to give a predetermined ratio of OsO₄ to reducing gas. In contact with a hot body this gas deposits metallic Os.

Electroless Noble Metal Plating

MOBIL OIL CORP. *U.S. Patent 3,511,683*

Pt and other noble metals are deposited on metal or mainly metal colloidal particles by displacement plating in non-aqueous solution. The particles must have an outer sheath of a reactive metal which is above the noble metal in the electrochemical series. In an example Sn-coated C black particles are coated from a solution of PtCl_4 in C_6H_6 . The coated particles are used in fuel cell manufacture. Other compounds used for displacement plating are a Au octadiene complex, Ag acetylide, Ir allyl and Ag perchlorate.

Plating Low Stress Bright Rhodium

SEL-REX CORP. *U.S. Patent 3,528,895*

An aqueous acid electrolyte for the deposition of bright low stress Rh contains Rh and Cu ions in synergistic combination with sulphamic acid.

Gold and Ruthenium Plating Baths

TECHNIC INC. *U.S. Patent 3,530,049*

An aqueous electroplating bath for depositing Ru contains a chelate of Ru with ethylenediamine tetraacetic acid, nitrilotriacetic acid or cyclohexanediamine tetraacetic acid. The above chelates are also used as grain refining agents in acidic Au plating baths.

Electrodeposition of Palladium

JOHNSON, MATTHEY & CO. LTD.

U.S. Patent 3,530,050

Electrolysis or electrodeposition of Pd is carried out with an aqueous neutral or alkaline bath containing a Pd compound and an ammonium salt of a weak organic acid which does not form an insoluble compound with the Pd compound.

Metallising Composition Conductor

INTERNATIONAL BUSINESS MACHINES CORP.

U.S. Patent 3,537,892

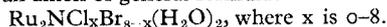
A conductive metallising composition for deposition and firing at $725\text{--}900^\circ\text{C}$ on an insulating substrate to form a conductive element consists of a metal component of 60–70% Au, 10–20% Pt and 10–30% Pd, a vitreous frit and a vehicle.

Ruthenium Complex

JOHNSON, MATTHEY & CO. LTD.

German Appl. 1,959,907

A new complex suitable for electroplating baths has an anion of general formula:



Pore-free Coatings with Group VIII Metals

H. GUENTHER et al. *East German Patent 71,678*

Pt coatings are produced on metals such as Ti or Tl by electrolytic polishing of the surface, then coating with a thin layer of Pt followed by a diffusion annealing treatment at $650\text{--}800^\circ\text{C}$ for at least 20 min. This may be followed by the deposition of an additional Pt layer.

LABORATORY APPARATUS AND TECHNIQUE

Pulse-activated Polarographic Hydrogen Detector

NATIONAL AERONAUTICS & SPACE

ADMINISTRATION

U.S. Patent 3,509,034

A polarographic H_2 detector has three electrodes, a platinised anode, a Cu reference electrode and an auxiliary electrode, and a system for periodic reactivation of the platinised anode by means of potential pulsing.

HETEROGENEOUS CATALYSIS

Oxidation Catalyst

JOHNSON, MATTHEY & CO. LTD.

British Patent 1,208,101

In a continuous process for the preparation of gluconic acid or glucosaccharic acid, an aqueous solution of glucose containing Na or K carbonate or bicarbonate is contacted in a trickle column with an O_2 -containing gas and in the presence of a supported Pt group metal.

Catalytic Conversion of Gases

SHELL INTERNATIONAL RESEARCH MIJ. N.V.

British Patent 1,210,867

An apparatus is described in which the activity of a catalyst, e.g. Pt, for the reduction of HNO_3 tail gases, is not reduced by the presence of solid particles in the gases.

Oxidation Catalyst

ROHM & HAAS G.m.b.H. *British Patent 1,214,793*

Dicyanogen is obtained by the oxidation of gaseous HCN admixed with CO or steam in the presence of a Pt group metal, e.g. a Pt gauze.

Hydrogenation Catalyst

TORAY INDUSTRIES INC. *British Patent 1,214,958*

Cyclohexane is produced by the hydrogenation of C_6H_6 in the presence of Pt on a carrier.

Oxidation Catalyst

ZAKLADY AZOTOWE IM. P. FINDEVA

British Patent 1,216,019

Oxidation of NH_3 to HNO_3 is catalysed by PtO_2 .

Catalyst

CENTRE NATIONAL D'ÉTUDES SPATIALES

British Patent 1,216,240

A catalyst for the decomposition of N_2H_4 and its derivatives (for use in rocketry) consists of 25–45 wt.% of Ir on a porous Al_2O_3 carrier, the combination being free from both S and Br_2 .

Curing of Organosilicon Compositions

DOW CORNING CORP.

British Patent 1,217,618

Si resin compositions are cured with 0.1 ppm of Pt and a tetramethyl guanidine carboxylate in an

amount representing 0.01–4 moles per g. atom of Pt.

Hydrocracking Process

TEXACO DEVELOPMENT CORP.

British Patent 1,217,815

High octane fuels are produced by two stage hydrocracking. The first stage uses a base metal catalyst and the second stage a noble metal catalyst.

Unsaturated Ester Production

MITSUI PETROCHEMICAL INDUSTRIES LTD.

British Patent 1,219,510

The reaction of an alcohol and/or aldehyde with O_3 to form an ester of an unsaturated carboxylic acid is catalysed by Ru, Rh, Pt, Pd or an oxide of one of these metals on a support.

Aromatic Compound Production

ASAHI KASEI K. K. *British Patent 1,219,704*

Aromatic compounds are produced from petroleum fractions by contacting them with H_2 at 400–650°C in the presence of a supported catalyst. The catalyst consists of Al_2O_3 or another support impregnated with 0.1–1% Pt, 0.1–1% Pd and 5–25% Cr oxide. The catalyst is treated with H_2 after impregnation with the active metals.

Hydrogenation Catalyst

SINCLAIR RESEARCH INC. *U.S. Patent 3,506,566*

Clarified or decant oil is converted to distillate fuel by a two-stage catalytic hydrocracking-hydroisomerisation process. The second-stage catalyst is a noble metal catalyst, e.g. Pt/ Al_2O_3 or Pt/alumino-silicate.

Catalytic Reforming Process

CHEVRON RESEARCH CO. *U.S. Patent 3,507,780*

A reforming process using a catalyst containing 0.01–0.3% Pt, 0.01–0.3% Re, and 0.001–0.1% Ir associated with a porous solid carrier is started up by contacting the naphtha with the catalyst in the presence of an inert gas, for example, N_2 . The pressure in the reforming zone should be about 200 p.s.i.g. and the catalyst temperature about 650°F when the naphtha is first contacted with the catalyst at a space velocity of 1 v/v/h. The catalyst temperature is increased to 900°F over a 2–3 hour period while building up autogeneous pressure of produced H_2 . See also *U.S. Patent 3,507,781*.

Catalytic Production of LPG

UNIVERSAL OIL PRODUCTS CO.

U.S. Patent 3,511,773

A hydrocarbon feedstock is converted to LPG and high octane reformat using a catalyst of a Pt group component and a halogen component combined with a carrier containing Al_2O_3 and about 1–10% of crystalline aluminosilicate. Pt

is the preferred catalyst for the selective cracking of paraffins to C_3 and C_4 hydrocarbons and production of a high octane reformat.

Paraffin Conversion Catalyst

SHELL OIL CO. *U.S. Patent 3,511,888*

A new catalyst for paraffin dehydrogenation and dehydrocyclisation consists of 0.01–5% Pt and/or Pd modified with Sn or Bi on inert SiO_2 .

Purifying Hydrogen Separated from a Catalytic Reforming Effluent

UNIVERSAL OIL PRODUCTS CO.

U.S. Patent 3,520,799

A process is described for the catalytic reforming of hydrocarbons in the presence of H_2 to produce high quality gasoline boiling range products. Relatively impure hydrogen for recycle purposes and other uses is provided by compressing and contacting this hydrogen with a portion of the liquid reformed product. Catalysts are e.g. Pt/ Al_2O_3 . *U.S. Patent 3,520,800* is similar.

Hydrocarbon Conversion Process

UNIVERSAL OIL PRODUCTS CO.

U.S. Patent 3,523,914

A hydrocarbon conversion catalyst consists of a Pt group metal and a Re component combined with a carrier material containing Al_2O_3 and a finely divided crystalline aluminosilicate. In one example it contains 0.05–1.0% Pt and 0.05–1.0% Re, combined with $\gamma-Al_2O_3$ carrier material having 0.5–20% of the H_2 form of mordenite uniformly distributed.

Hydrogenation Catalyst

UNIVERSAL OIL PRODUCTS CO.

U.S. Patent 3,529,029

Aromatic hydrocarbons are hydrogenated to cycloparaffins in the presence of a catalyst which contains 0.01–2.0 wt.% Pt or Pd, 0.01–2.0 wt.% Re and 0.01–1.5 wt.% of an alkali metal, preferably Li.

Catalytic Dehydrogenation of Cyclohexanol and/or Cyclohexanone

INSTITUT FRANCAIS DE PÉTROLE, DES CARBURANTS ET LUBRIFIANTS

U.S. Patent 3,534,110

Phenol is made by the catalytic dehydrogenation of cyclohexanol or cyclohexanone where the catalyst contains Pt and preferably also Ir on a SiO_2 carrier of 100–300 m^2/g specific surface and 0.7–1.1 cm^3/g porous volume.

Dehydrogenation over Platinum-Rhenium Catalyst

CHEVRON RESEARCH CO. *U.S. Patent 3,535,402*

Paraffins with 3–5 C atoms are dehydrogenated by contacting the paraffins with the catalyst containing 0.1–3% Pt and 0.1–5% Re associated with a non-acidic porous solid carrier. De-

hydrogenation conditions include a temperature of 900–1100°F and a pressure of 3–100 psig.

Catalytic Hydrogenation of Nitrobenzene

INTERNATIONAL NICKEL LTD.

French Patent 1,587,963

An aqueous solution of nitrobenzene is hydrogenated to aminophenol in the presence of a Pt-Ru catalyst, e.g. Pt-Ru/C.

Hydrogenation of Unsaturated Aldehydes

JOHNSON, MATTHEY & CO. LTD.

German Appl. 1,568,861

Unsaturated aldehydes are reacted with H₂ in the presence of a catalyst containing Pt activated by an alcoholic alkali metal hydroxide or oxide solution.

Improved Selective Catalyst Reduction

JOHNSON, MATTHEY & CO. LTD.

German Appl. 1,568,894

A new process is intended to increase the selectivity and thus the yield of alcohol in the reduction of an aromatic aldehyde or ketone. For the process a known Pd catalyst, e.g. palladised wood charcoal, is used in the presence of an amine, especially an aromatic amine.

Catalyst

W. R. GRACE & CO. *German Appl. 1,933,240*

H₂CN is produced by the gas-phase reaction of a hydro-carbon (e.g. CH₄) with NH₃ in the presence of a catalyst of 0.1–0.6 wt. % Pt/mullite.

Dewaxing Catalyst

CHEVRON RESEARCH CO. *German Appl. 1,954,368*

Hydrocarbons are dewaxed by reaction with H₂ in the presence of a catalyst which consists of 0.01–3 wt. % Pt and 0.01 to 5 wt. % Re on a porous solid support.

Hydrocracking Catalyst

CHEVRON RESEARCH CO. *German Appl. 1,956,715*

A hydrocracking catalyst consists of a layered crystalline aluminosilicate on which is deposited 0.01–2% of Pt, Pd, Ir or their compounds and 0.01–2% of Re or a Re compound.

Hydrocracking Catalyst

CHEVRON RESEARCH CO. *Dutch Appl. 70.02,354*

A hydrocracking catalyst consists of a hydrogenating metal deposited on an amorphous aluminosilicate carrying 0.0–5.0 wt. % F or fluoride. The Al₂O₃:SiO₂ ratio is 70:30 to 5:95. The catalytic metal is 0.005–2.0% of Pt, Pd, Ir and/or their compounds and 0.005–2.0% of Re and/or Re compounds.

Dehydrogenation Catalyst

INSTITUT FRANCAIS DE PÉTROLE, DES

CARBURANTS ET LUBRIFIANTS

Dutch Appl. 70.04,770

A new catalyst for the dehydrogenation of saturated hydrocarbons consists of Al₂O₃ sup-

porting 0.05–2 wt. % Pt and 0.01–0.5 wt. % Ir, Ru and an alkali or alkaline earth metal representing 0.3–10 times the amount of noble metals.

HOMOGENEOUS CATALYSIS

New Platinum Catalysts

GENERAL ELECTRIC CO. *British Patent 1,211,699*

Significantly improved hydrosilation of aliphatic unsaturated materials can be obtained by using as catalyst a Pt-siloxane complex, e.g. Pt complexed with 1,3-divinyl-tetramethyldisiloxane or 1,3-divinylditetrphenyldisiloxane.

Catalyst

FARBENFABRIKEN BAYER A.G.

British Patent 1,213,779

Organic-silicon compounds are obtained by the addition of a silane or siloxane to an olefinically unsaturated organic compound in the presence of Me₃Py₂PtI.

Production of Hydroquinone

LONZA LTD. *British Patent 1,215,568*

C₂H₂, CO and H₂ are combined at increased temperature and pressure in the presence of [Ru(CO)₁]₃.

Catalytic Hydrogenation or Hydroformylation

JOHNSON, MATTHEY & CO. LTD.

British Patent 1,219,763

A hydrogenation or hydroformylation process is catalysed in the presence of a base by a Pt metal hydride, halide or pseudohalide complexed by an organic isocyanide or a Group VB or VIB compound. For Rh and Ir halides a Sn or Ge dihalide may also serve as the complexing agent. Particular catalysts are (PPh₃)₃RuCl₂ and RhII(CO)(PPh₃)₂.

Platinum Complexes

RHONE-POULENC S.A. *U.S. Patent 3,522,327*

New complexes of PtCl₂ with triaminophosphines are useful catalysts for curing organopolysiloxane resins. They have the general formula: PtCl₂.2P(NR'R'')₃ and are formed by simple addition.

Homogeneous Dehydrogenation of Paraffins

ETHYL CORP. *U.S. Patent 3,524,898*

6–20 C paraffins are dehydrogenated by contacting them with a carbonyl halide Group VIII metal catalyst complex, such as IrCl(CO)(PR₃)₂, at 300–425°C, optionally in the presence of a H acceptor.

Hydrogenation Catalysts

IMPERIAL CHEMICAL INDUSTRIES LTD.

U.S. Patent 3,524,899

Catalysts for the hydrogenation of ethylenic or acetylenic compounds are the reaction products

of a Ru compound in which the metal has a valency of two or more and a simple or complex halide of an element of Group IA, IIA or IIIB. Examples are $\text{RuCl}_3(\text{H}_2\text{O})_3$, $\text{RuCl}_3(\text{SEt}_2)_3$, $\text{RuCl}_2(\text{PPh}_3)_3$ and $\text{RuCl}_2(\text{AsEt}_3)_3$.

Hydrocarboxylation of Olefins

UNION OIL CO. *U.S. Patent 3,530,155*
Olefins are hydrocarboxylated by contacting the olefin under liquid phase conditions with a catalyst which consists of a Pt or Pd complex with an aromatic phosphine, H_2O and CO . High reactivity and high yields of the normal acid are obtained by incorporating an anionic or nonionic surface active agent in the reaction medium.

Copolymerisation Catalysts

ČESKOSLOVENSKA AKADEMIE VED.
German Appl. 2,008,427
A siloxane is copolymerised with an unsaturated compound in the presence of a Group VIII metal complex, which may be, e.g. $\text{RhCl}(\text{PPh}_3)_3$, $\text{RuCl}(\text{H})(\text{PPh}_3)_3$ or $\text{H}(\text{CO})\text{Rh}(\text{PPh}_3)_3$.

FUEL CELLS

Three-layer Fuel Cell Electrode

UNION CARBIDE CORP. *British Patent 1,216,794*
The fuel cell electrode structure consists of a fine-pored porous metal layer on the electrolyte side, a gas-permeable plastic-bonded catalyst layer and a coarse-pored porous metal layer. The plastic-bonded layer may contain a noble metal catalyst, e.g. Pt/C in p.t.f.e.

Gas Diffusion Electrodes

ROBERT BOSCH G.m.b.H. *British Patent 1,220,013*
Gas diffusion electrodes for fuel cells are produced by coating a gas-permeable base with a varnish containing the catalyst metal. In one example Au and Pt dioxide dispersed in a cyclised rubber varnish are used to produce a catalyst layer on a p.t.f.e. plate.

Metal Boride Fuel Cell Catalyst

LEESONA CORP. *U.S. Patent 3,513,028*
New catalysts for fuel cells are Group III-VIII transition metal borides. The preferred catalysts are Ni, Ru, Rh, Pd, Os, Ir and Pt borides. They may be produced by coating a porous substrate with a metal black and then treating the coating with an alkali metal borohydride.

Fuel Cell Electrode Production

MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD.
German Appl. 1,964,568
A mixture of Ni and Sb is produced by reduction from a solution containing ions of both metals. This mixture is then added to a solution of a Pt group metal salt and the Pt ions reduced to Pt metal.

CHEMICAL TECHNOLOGY

Heating of Corrosive Vapours

LAPORTE TITANIUM LTD.
British Patent 1,219,573
 TiCl_4 vapour is heated in a plurality of tubes having inlets and outlets made of Pt or an alloy of Pt with Rh, Ru or Ir.

Degassing Platinum Powders

E.I. DU PONT DE NEMOURS & CO.
U.S. Patent 3,511,640
A process for preparing degassed Pt powders consists of mixing finely divided Pt powder with at least an equal volume of a diluent metal oxide powder and heating the mixture until all gases have evolved. The powder mixture is cooled and the Pt powder separated from the diluent. The degassed powders are particularly suitable for application to "green" ceramic sheets used in the production of monolithic multi-layer ceramic circuit components.

Catalytic Igniter Members

ROLLS-ROYCE LTD. *U.S. Patent 3,527,680*
The activity of a Pt or Pt alloy catalytic igniter for a gas turbine engine is improved by etching the igniter to remove the initial surface layer, plating the member with a layer of Pt which supports catalytic ignition and heat treating.

Separation of Hydrogen from Gas Mixtures

JOHNSON, MATTHEY & CO. LTD.
German Appl. 1,567,601
A H_2 diffusion membrane consists of a Pd alloy containing 0.7–0.8% B and 4.5% Ag, or 4.3% Ag and 0.75% B.

Diffusion Device

JOHNSON, MATTHEY & CO. LTD.
German Appl. 2,005,494
A device for the separation of H_2 from gas mixtures consists of a stack of spaced Ag-Pd diffusion members.

Platinum Coating of Refractories

CORNING GLASS WORKS *German Appl. 2,007,056*
Refractory materials are coated with Pt or Pt alloys by flame spraying with a plasma flame at a rate of at least 30 m/sec. The powder is classified to 20–44 μ before spraying. The coating is heated to at least 1250°C.

GLASS TECHNOLOGY

Stirrer for Molten Glass

PILKINGTON BROS. LTD. *British Patent 1,211,797*
A stirrer for molten glass consists of a Mo core coated with a refractory material (e.g. Al_2O_3) and sheathed with Pt or Pt alloy. The gas space between core and sheath is charged with inert gas.

ELECTRICAL AND ELECTRONIC ENGINEERING

Capacitor

ERIE TECHNOLOGICAL PRODUCTS INC.
British Patent 1,212,820

A capacitor consisting of a central ceramic layer sandwiched between two outer layers of the same ceramic has painted-on electrodes of Pt-Pd, for example, and electrode terminals of Ag paint.

Field Effect Transistor

TELEFUNKEN PATENTVERWERTUNGS G.M.B.H.
British Patent 1,217,665

In a field effect transistor, metal electrodes are applied to its semiconductor body as a source and drain and, together with the body, for metal-semiconductor rectifying contacts. Au, Pt and Pd are suitable contacts.

Self-regulating Heating Elements

JOHNSON, MATTHEY & CO. LTD.
U.S. Patent 3,520,043

Self-regulating heating elements have first and second components connected in parallel so that the resistivity of the element increases with temperature. Preferably one component forms a sheath for a core made from the other component. Suitable materials for the sheath include Ni-Cr and Fe-Ni-Cr alloys; suitable materials for the core (apart from Fe, Fe alloys, Ni and Ni alloys) include Co, Mo, W, Pt, Pd and Ta.

Semiconductor Connections

HEWLETT-PACKARD CO. *U.S. Patent* 3,521,134

A metallic contact pad is formed on stripped areas of a semiconductor to reduce the thermal and electrical resistance. Pt silicide covered with Au and Mo provides a suitable material for the pad.

Glass Electrode

BECKMAN INSTRUMENTS INC.
U.S. Patent 3,523,777

In a method of sealing an internal half-cell (Pt/Ag/AgCl) into a constricted portion of an inner glass tube, the constricted portion is painted with Ag paint and then sealed on to the Pt wire by induction heating.

Platinum Coated Electrode

MATTHEY BISHOP INC. *U.S. Patent* 3,532,556

A process of coating substrates with Pt involves reacting a Pt-type oxide with a reducing and dispersing medium composed of a 2-5 C aliphatic alcohol. A water-soluble inorganic salt or acid is added and most of the dispersion medium is removed from the platinised substrate while retaining the Pt wet and oxidising residual adsorbed organic matter, and removing water.

The reducing and dispersing medium preferably also includes formaldehyde.

Electric Film Resistance

SIEMENS A.G. *German Appl.* 1,480,606
An electric film resistance, applied to glass or ceramic, consists of 40-60% Au, 10-15% Pt, 25-30% Pd and 5-10% Rh or Rh₂O₃.

Printed Heater Elements

JOHNSON, MATTHEY & CO. LTD.
German Appl. 1,912,216

Resistor compositions for use as heating elements may be applied by screen or other printing techniques to various ceramic substrates. They consist of a mixture of 10-80 wt.% (especially 46-65 wt.%) of finely divided RuO₂ and balance glass. Alternative compositions include finely divided Ag and compositions of matter formed by heating RuO₂ with a Group V metal oxide, such as NbO₅. See also *German Appl.* 1,640,561.

Anode for X-Ray Tubes

METALLWERKE PLANSEE A.G.
German Appl. 1,952,526

The anode is made from an alloy of W containing 0.05-5%, preferably 0.15-1.5%, Pt.

Brine Electrolysis Electrode

IMPERIAL METAL INDUSTRIES (KYNOCHE) LTD.
Dutch Appl. 70.06,285

An electrode is made with a surface of film-forming metal coated with Ru and/or RuO₂ mixed with a chemical compound containing the film-forming metal, Cl₂ and O₂. The film-forming metal may be Ti, Ta, Nb or their alloys. A suitable chemical compound is Ti oxychloride.

MECHANICAL ENGINEERING

Drawing Ruthenium and Alloys to Wire

INTERNATIONAL NICKEL CO.
U.S. Patent 3,528,862

Improved results in drawing Ru or Ru alloy wire are obtained with a new process involving special control of the die temperature at 1000-1300°C in a non-oxidising atmosphere. The metal is drawn through a wire drawing die at 900-1050°C.

TEMPERATURE MEASUREMENT

Thermocouple

GENERAL MOTORS CORP. *U.S. Patent* 3,527,620

A high-temperature thermocouple system consists of a pair of interconnected thermoelectric elements, one an alloy containing 55 wt.% Pd, 31 wt.% Pt and 14 wt.% Au, and the other 65 wt.% Au and 35 wt.% Pd.