

oleate gives a 95% yield of erythro-9,10-dihydrocystearic acid, and with Na undecylenate it produces 10,11-dihydroxyundecanoic acid and sebacic acid.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Fritted Thick Film Conductor Adherence: Role of Firing Atmosphere

P. F. BECHER, *J. Mater. Sci.*, 1978, **13**, (2), 457-459  
The adherence of a Pt-Au thick film on  $Al_2O_3$  substrates, fired in different conditions, was determined together with the thick film substrate microstructure. The adherence is degraded by reducing firing and in Ar- $H_2$ , which causes very little sintering and poor metal-to-glass wetting. Firing at 850 or 950°C produced a few glass fibrils across the metal-glass interface, but none were observed after firing at 1050°C.

### Effect of Tool Shape when Ultrasonic Wire Welding. Part I: Al-1% Si Wires to Pd-Ag Thick Films

C. J. DAWES, *Weld. Inst. Res. Bull.*, 1978, **19**, (1), 15-20

The effect of wedge geometry on weld reliability when ultrasonically wedge wire welding 25  $\mu$ m diameter Al-1% Si wires to Pd-Ag thick film circuits was studied. The flat wedge profile was better than the transverse groove, concave and longitudinal groove profiles. The transverse grooved wedge over deformed the wire at the welds which had low pull strengths, the concave wedge could damage the circuit films by the wedge touching the circuit track, and the longitudinal groove wedge was unsuitable because wire/groove alignment could not be achieved.

## NEW PATENTS

### METALS AND ALLOYS

#### Hydrogen-Diffusion Alloy

EUROPAISCHE ATOMGEMEINSCHAFT (EURATOM)

*German Offen.* 2,719,807

A membrane for separation of hydrogen from HI and I is an alloy of Pd with 5-23% Sn and/or 2-7% Si.

### ELECTROCHEMISTRY

#### Electrochemical Cell

NATIONAL RESEARCH DEVELOPMENT CORP.

*British Patent* 1,496,660

Pt gauze distributors are used in an electrochemical cell in which cathode and anode are provided by a fluidised bed of C particles.

### A High Voltage, High Performance Thick Film Resistor System

S. J. STEIN, C. HUANG and A. S. GELB, *Electrocomponent Sci. Technol.*, 1977, **4**, (2), 95-104

A new series of thick film resistors, based on a Ru compound semiconducting phase and dispersed in a compatible glassy matrix is described. The conducting networks present in the structure include ohmic, non-ohmic and insulating barriers. High electric fields shift the relative concentrations of these barriers by converting insulating barriers into semiconducting or conducting layers. Refiring effects, resistor geometry effects and the voltage coefficient of resistance are discussed.

## TEMPERATURE MEASUREMENT

### Note on the Relation between Resistance Thermometer, Thermocouple, and Radiation Temperature Scales: 630-1064°C

J. P. EVENS, *Metrologia*, 1977, **13**, (4), 171-172

Temperatures determined by radiation thermometry differ substantially from values on the International Practical Temperature Scale (I.P.T.S.) of 1968 in the range 630-1064°C. Temperatures derived from a quadratic interpolation equation for high temperature Pt resistance thermometers have similar values agreeing more with the radiation thermometry measurements than I.P.T.S. I.P.T.S. is defined in this range by a quadratic equation for a Pt-10% Rh/Pt thermocouple. These discrepancies would change if the fixed point temperature values were altered and different fixed points chosen. However, the simple quadratic interpolation equation for Pt resistance thermometers gives values close to thermodynamic values.

### Oxidative Purification of Aqueous Effluents

WESTINGHOUSE ELECTRIC CORP.

*British Patent* 1,498,355

Waters containing small amounts of phenol are purified by electrolytic oxidation using electrodes of Pt/C or  $RuO_2$ .

### Oxygen Generation Catalyst

GENERAL ELECTRIC CO.

*U.S. Patent* 4,039,409

Oxygen is generated electrolytically on a catalytic anode consisting of a Pt-Ru alloy comprising reduced oxides of Pt and 5-60% Ru.

### Platinum Coated Anode

G. THIELE ET AL

*U.S. Patent* 4,042,484

A protective cover layer for electrolytic metal anodes, for use in the production of chlorine and

sodium hydroxide is of formula  $M_nPt_3O_4$  (M is Li, Na, K, Ag or Cu, n is 0.4-0.6).

### Colloidal Platinum

PROTOTECH CO. *U.S. Patent 4,044,193*  
Very fine particulate colloidal Pt, of the 15-25Å size range, with catalytic activity, for use in fuel cell catalytic electrodes is reported.

### Ion Sensitive Electrode

NATIONAL RESEARCH DEVELOPMENT CORP.  
*U.S. Patent 4,052,285*  
The electrodes may contain ion-sensitive glass particles, the composition of which may include  $La_2O_3$  and/or  $PtO_3$  and  $Y_2O_3$  and also contain a conductive member which may be of Pt.

## ELECTRODEPOSITION AND SURFACE COATINGS

### Turbine Blade Coating

GESELLSCHAFT FÜR KERNFORSCHUNG m.b.H.  
*British Patent 1,495,626*

Turbine blades have a core of highly heat-resistant alloy, and an outer coating of a highly heat-resistant, non-porous, corrosion-resistant metal, such as Rh, Ir or Pt.

### Gold-Palladium Alloy Electrodeposition

OXY METAL INDUSTRIES CORP.  
*U.S. Patent 4,048,023*  
Pd-Au alloys are electrodeposited from a bath containing 1-50 g/l Au as a Group IA Au sulphite and 0.05-10 g/l Pd in the form of palladosamine chloride, at pH 5.5-11.0.

### Iridium Coating Composition for Electrodes

SOLVAY & CIE. *U.S. Patent 4,049,532*  
An electrode for use in electrochemical cells is formed of Ti or its alloy coated with composition containing a heat-decomposable Ir compound.

### Iridium Plating

G. A. VARTANOVA ET AL *Russian Patent 531,896*  
An Ir electroplating solution contains per litre, 2-4 g potassium hexachloroiridate, 24-60 g potassium bisulphate, 6-15 g potassium chloride and 10-12 g potassium hydroxide.

## LABORATORY APPARATUS AND TECHNIQUE

### Platinum Group Metal Catalyst for Methane Detector

R.S.E. CORP. *U.S. Patent 4,045,177*  
The detector has a Wheatstone bridge circuit which has a refractory-coated detector element with an oxidation catalyst on it. This catalyst is Pt and/or Pd black.

## HETEROGENEOUS CATALYSIS

### I.C.E. Exhaust Oxidation/Reduction Catalysts

E.I. DU PONT DE NEMOURS & CO.  
*British Patents 1,489,785-6*

The catalysts comprise mixed metal oxides having the perovskite structure and containing a Pt-group metal such as  $[Sr_xLa_{1-x}][Co_{1-y}Ru_y]O_3$  or  $[Sr_xLa_{1-x}][Co_{1-y}Pt_y]O_3$ .

### Oxidation Catalysts

IMPERIAL CHEMICAL INDUSTRIES LTD.  
*British Patent 1,491,205*

Catalysts for flameless heaters are synthetic metal oxide polycrystalline fibres supporting Pt, Pd and/or Rh.

### I.C.E. Exhaust Gas Purification Catalyst

U.K. ATOMIC ENERGY AUTHORITY  
*British Patent 1,491,445*

The catalyst is a channelled strip of Al-bearing ferritic steel, at least partly coated with  $Al_2O_3$ , on which is deposited a catalyst which is selected from Pt, Pd, Ir, Rh and their alloys.

### Metallic Substrates Catalysts

JOHNSON MATHEY & CO. LTD.  
*British Patent 1,492,929*

Catalysts for oxidation of  $NH_3$  in  $HNO_3$  manufacture, flameless combustion of hydrocarbon fuels and purification of automobile exhaust gases consist of a heat- and oxidation-resistant Fe-base alloy substrate coated with a refractory oxide and then with a catalytically active material selected from one or more of Ru, Rh, Pd, Ir, Pt, Au, Ag and their alloys, optionally with base metals.

### Oxidation Catalysts

IMPERIAL CHEMICAL INDUSTRIES LTD.  
*British Patent 1,497,414*

Olefinic diamines, useful in the manufacture of nylon, are obtained by reaction of olefins with hydrogen cyanide and oxygen in the presence of a carboxylic acid and Pt or preferably Pd, optionally promoted with Cu, Sn or Fe.

### Platinum Group Metal Catalyst for Halogenated Hydrocarbons Production

EXXON RESEARCH & ENGINEERING CO.  
*U.S. Patent 4,041,091*

Halogenated hydrocarbons are selectively prepared from  $H_2$ , CO and a halogen over a supported catalyst of Pt-Re, Pt-Ir, Pt, Ir or Re.

### Platinum-Tin Promoted Zinc Aluminate Catalyst Reactor

PHILLIPS PETROLEUM CO. *U.S. Patent 4,041,099*  
An improved Pt-Sn promoted Zn aluminate catalyst reactor for dehydrogenation of hydrocarbons is described.

**Light Sensitive Palladium Complex Catalysts**  
EASTMAN KODAK CO. *U.S. Patent 4,042,392*  
Formazan dye images are prepared by the reduction of tetrazolium salts using as catalyst a Group VIII, specifically Pd complex catalyst.

**Platinum Group Metal Catalyst for Upgrading Hydrocarbons**

TEXACO INC. *U.S. Patent 4,042,490*  
Mixtures of 6-30C n-paraffins and byproducts are converted to pure n-paraffins by hydrogenation using a catalyst system of  $Al_2O_3$ , 0.1-5.0% Group VIII metal, specifically Pt, Pd, Rh, Ru, Ni or Co and 0.05-2.0% Group IA, IIA and/or Tl(I) oxide.

**Trimetallic Platinum Group Metal-Containing Catalyst**

U.O.P. INC. *U.S. Patent 4,048,099*  
A catalyst for the conversion of hydrocarbons contains 0.01-2.0% Pt group metal, 0.01-5.0% Group IVA metal, 0.01-3.0% Group VIB transition metal and 0.1-3.5% halogen.

**Platinum Catalyst**

STE. LYONNAISE DES APPLICATIONS CATALYTICS S.A. *U.S. Patent 4,048,113*  
A catalyst mass for the oxidation of  $NH_4$  consists of a sheet of  $Al_2O_3$  fibres coated with a Pt catalyst and contacted with a layer of mineral wool.

**Platinum-Ruthenium Reforming Catalyst**

MOORE-MCCORMACK ENERGY INC. *U.S. Patent 4,053,388*  
A process for obtaining a high yield of aromatics from naphtha, by integrating a catalytic reformer and a thermal hydrocracking unit, followed by fractionating the product stream to give the desired aromatic, uses Pt-Ru as the reforming catalyst.

**Rhodium- and Platinum-Containing Catalyst**

JOHNSON MATTHEY & CO. LTD. *U.S. Patent 4,053,556*  
In a process for the reduction of an oxide of N with a reducing fuel or the oxidation of an organic compound in a gas containing oxygen, a catalyst is used which consists of an inert rigid porous refractory honeycomb structure having a first coating containing at least one of the oxides of Ti, Zr, Hf and Th and preferably at least 50% by weight  $Al_2O_3$  and a second coating of an alloy of Rh 1-50 wt.%, base metal 0.01-25 wt.% and balance Pt.

**Cation-Exchanged Carbon Catalysts**

STAMICARBON B.V. *Dutch Appl. 76.04669*  
Improved hydrogenation, oxidation and reforming catalysts are obtained by using a C support which is oxidised to introduce acidic groups,

reduced and then cation-exchanged with Ir, Os, Pd, Pt, Rh, Ru, Ag, Au, Co, Cu, Fe, Ni and/or Zn compounds or complexes.

**HOMOGENEOUS CATALYSIS**

**Olefin Hydroformylation Catalyst**

E.I. DU PONT DE NEMOURS & CO. *British Patent 1,491,134*  
The hydroformylation catalyst has the formula  $L_nMH^+X^-$  where n is 2-4, M is Ni, Pd or Pt, L is a trivalent organophosphorus ligand and X is an anion, such as hydridotris (triethyl phosphine)Pt(II)hexafluorophosphate.

**Rhodium Hydroformylation Catalyst**

B.A.S.F. A.G. *British Patent 1,495,595*  
1,6-Hexanediol is obtained by hydroformylation of butadiene in the presence of a catalyst which is a Rh carbonyl complex with a tertiary phosphine or phosphite.

**CHEMICAL TECHNOLOGY**

**Oxidative Catalyst Recovery**

JOHNSON MATTHEY & CO. LTD. *British Patent 1,493,933*  
A coked C-supported Group VIII noble metal catalyst, or Ag-containing photographic film, is heated in an aqueous medium under pressure in an oxidising atmosphere to destroy the support along with the coke deposit, the catalytic metal or Ag catalysing the oxidation reaction.

**Palladium-Tobacco Composition**

LIGGETT & MYERS INC. *British Patent 1,493,971*  
The concentration of polycyclic aromatic hydrocarbons in tobacco smoke is reduced by incorporation of 0.001-1% of Pd in the tobacco.

**Amine Extraction of P.G.M.s**

MATTHEY RUSTENBURG REFINERS (PTY.) LTD. *British Patent 1,495,931*  
An acidic aqueous solution containing salts of Pt, Rh and Ir is treated with a reducing agent to convert Ir(IV) to Ir(III), and Pt is extracted with a secondary or tertiary amine or quaternary ammonium compound. The residual aqueous solution is then treated with an oxidising agent, and the tetravalent Ir so produced extracted with a further quantity of secondary or tertiary amine or quaternary ammonium compound.

**Amine Extraction of P.G.M.s (Oxidised Route)**

MATTHEY RUSTENBURG REFINERS (PTY.) LTD. *British Patent 1,497,534*  
An oxidised acidic solution containing salts of Pt, Rh and Ir, is treated with an organic nitrogen compound, preferably a tertiary amine, to extract

Pt and Ir, leaving the Rh in the aqueous phase. The Pt and Ir are then re-extracted into an aqueous medium, and separated by reduction of the Ir salt.

#### Solvent Extraction of Palladium

MATTHEY RUSTENBURG REFINERS (PTY.) LTD.  
*British Patent 1,497,535*

Pd is extracted from acidic aqueous solutions containing other Group VIII noble metals and small amounts of base metals with a water-immiscible solution of a hydroxy oxime.

#### High-Temperature Antifriction Material

ORDENA TRUDOVOGO KRASNOGO ZNAMENI INSTITUT  
PROBLEM MATERIALOVEDENIYA AN UKR. S.S.R.

*Russian Patent 633,653*

The composition is Co containing 10-20% solid lubricant ( $\text{MoS}_2$ ) and 5-15% Pd.

### GLASS TECHNOLOGY

#### Furnace Orifices

JOHNS-MANVILLE CORP. *British Patent 1,489,845*  
A glass-melting furnace has two successive outlet orifices, the outermost of which is made from Pt, Pd, Rh, or alloys thereof.

#### Glass Manufacture

P.P.G. INDUSTRIES INC. *British Patent 1,498,274*  
In an apparatus for the manufacture of continuous sheet flat glass, the threshold may be of Pt.

### ELECTRICAL AND ELECTRONIC ENGINEERING

#### Platinum Metallisation Pattern

BELL TELEPHONE LABORATORIES INC.  
*U.S. Patent 4,039,698*

A Pt compound whose heat of formation is -100 to +10 kcal/mol is deposited in a pattern on a substrate and the compound reduced to metal. Suitable compounds are Pt oxide, chloride, bromide and iodide.

#### Platinum Group Isolating Material for Diamond Production

GENERAL ELECTRIC CO. *U.S. Patent 4,042,673*  
A layer of Pt, Ir, Os, Rh, Pd and Ru is used as an isolating material in the production of boron-containing diamond crystals.

#### Platinum Silicide Fuse Links

ADVANCED MICRO DEVICES INC.  
*U.S. Patent 4,042,950*  
Selected circuit elements and interconnections of an integrated circuit device are connected by Pt silicide fuse links which open when electrical power exceeds a threshold amount.

#### Platinum Resistance Layer for Resistor

W. C. HERAEUS G.M.B.H. *U.S. Patent 4,050,052*  
An electrical temperature measuring resistor structure, especially for resistance thermometers, has a strip of Pt contained in it.

#### Gold Microwire Production

VEB MANSFELD-KOMBINAT "WILHELM PIECK"  
*East German Patent 126,559*  
Very pure Au is doped with Fe and Y, Ir, Pd and/or Zr to give a material suitable for very fine wires.

#### Alloy for Electrical Contacts

VSESOYUZNYI NAUCHNO-ISSLEDOVATEL'SKII INSTITUT GOSNAKA *Russian Patent 548,649*  
A contact alloy of good mechanical strength contains 10-15% Pd, 0.01-2% Mn, 0.1-3% Zn, 0.1-5% Sn, 3-6% Ni and the remainder Ag.

### TEMPERATURE MEASUREMENT

#### Differential Thermal Probe

JOHNSON MATTHEY & CO. LTD.  
*British Patent 1,490,066*

Apparatus for detecting compositional changes in a gas stream includes one or two "Thermafilm" devices, one of which is in contact with a catalytic layer, and means for measuring the temperature change of the one device or the temperature difference between the two, the temperature changes indicating changes in the composition of the gas stream.

#### Resistance Thermometer

W. C. HERAEUS G.M.B.H. *German Offen. 2,615,473*  
The probe of a high-temperature resistance thermometer is a refractory support, coated with Pt and protected with a glaze containing particles of Au.

### MEDICAL USES

#### Hydrogenation Catalysts

DR. KARL THOMAE G.M.B.H.  
*British Patent 1,497,857*  
Pd, Pt, Rh, Ru and/or their compounds may be used as hydrogenation catalysts at various stages in the synthesis of arylaliphatic ketones and secondary alcohols useful as anti-tumour agents.

#### Platinum Complex for Cancer Treatment

RUSTENBURG PLATINUM MINES LTD.  
*Dutch Appl. 77.01909*  
New cancer treatment agents are Pt halide complexes of one or two branched aliphatic amines, such as *cis*-bis(2-amino-5-methyl-hexane) dichloro-*trans*-dihydroxy-platinum(IV).