

## CATHODIC PROTECTION

### Cathodic Alloying of the Surface of Titanium, Chromium, and Stainless Steels as a Method of Increasing Their Passivation and Corrosion Resistance

N. D. TOMASHOV, G. P. CHERNOVA and T. A. FEDOSEVA, *Corrosion (Houston)*, 1980, **36**, (4), 201-207

The electrospark technique and electrochemical deposition from solution followed by annealing were used to alloy the surfaces of Ti, Cr and stainless steels with electropositive metals. The corrosion resistance of Ti in (20-40%) H<sub>2</sub>SO<sub>4</sub> and (5-10%) HCl at 100°C is increased by plating the surface with Pd(1-10 μm) with or without subsequent annealing, and by electrospark alloying of stainless steels with Pd(0.5-0.6 μm). Cr deposits, unstable in H<sub>2</sub>SO<sub>4</sub> and HCl become stable if modified with Pd by galvanic plating with Cr and Pd layer after layer. Corrosion resistance improves with annealing. Fe-27Cr, and Fe-18Cr-10Ni steels became corrosion resistant in 20% H<sub>2</sub>SO<sub>4</sub> when coated with Pd.

### The Corrosion Behaviour and Rutherford Backscattering Analysis of Palladium-Implanted Titanium

G. K. HUBLER and E. McCAFFERTY, *Corros. Sci.*, 1980, **20**, (1), 103-116

The corrosion behaviour of Pd-implanted Ti in boiling 1M H<sub>2</sub>SO<sub>4</sub> was investigated by Rutherford backscattering profiles of the Pd concentration as a function of corrosion time, and by other methods. The rate of Ti dissolution was reduced by about 3 orders of magnitude for Pd-implanted samples. Soon after immersion the Pd surface concentration rises to 20 at.% because of preferential dissolution of Ti, and Pd is retained in the surface for corrosion times of up to 9h. The steady state corrosion potential of implanted samples is close to that of pure Pd.

## NEW PATENTS

### METALS AND ALLOYS

#### Nickel Base Alloy

SPECIAL METALS CORP. *British Patent* 1,565,606

A gamma prime strengthened Ni base alloy contains up to 6% Ru and up to 2% or one or more of the lanthanide metals.

#### Superplastic Aluminium Alloy

EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM) *British Patent* 1,565,620

An Al alloy containing 17-30% Pd and not more than 1% of impurities possesses superplastic properties. A preferred alloy has a purity of 99.5% + and a Pd content of 23%. The alloy may replace Pd sponge or powder catalysts in hydrogen/deuterium exchange reactions.

### ELECTRICAL AND ELECTRONIC ENGINEERING

#### A Study on a Palladium-Titanium Oxide Schottky Diode as a Detector for Gaseous Components

N. YAMAMOTO, S. TONOMURA, T. MATSUOKA and H. TSUBOMURA, *Surf. Sci.*, 1980, **92**, (2/3), 400-406

The current through a Schottky barrier formed at the interface between Pd film and n-type TiO<sub>2</sub> single crystal is sensitive to H<sub>2</sub> or other reducing gases in the ambient. This is explained by taking into account the diminished barrier height at the Pd/TiO<sub>2</sub> interface caused by the action of gases, which changes the work function of Pd. The change in Pd work function is confirmed by direct measurements of the metal surface potentials.

#### Effect of Ruthenium Ions on Grain Boundaries in Gallium Arsenide Thin Film Photovoltaic Devices

W. D. JOHNSTON, H. J. LEAMY, B. A. PARKINSON, A. HELLER and B. MILLER, *J. Electrochem. Soc.*, 1980, **127**, (1), 90-95

Chemisorption of Ru ions decreases the rate of carrier recombination at grain boundaries and the surface recombination velocity on thin film, polycrystalline n-GaAs grown by chemical vapour deposition. There is a pronounced improvement in charge collection at Au n-GaAs Schottky barriers following Ru treatment. After chemisorption of Ru ions a solar to electrical conversion efficiency of 4.8% was reached in the n-GaAs/0.8 M K<sub>2</sub>Se-0.1 M K<sub>2</sub>Se<sub>2</sub>-1 M KOH/C liquid junction cell with semiconductor grains of 3-7 μm diameter. The Ru effect is more dramatic than that shown in single crystal substrates, increasing the power conversion efficiency by up to a factor of four over etched specimens.

### CHEMICAL COMPOUNDS

#### Osmium Tetroxide Complexes

JOHNSON MATTHEY & CO. LTD.

*British Patent* 1,560,481

Complexes suitable for fixing and staining cells for electron microscopy are obtained from OsO<sub>4</sub> and an aromatic tertiary amine, a cycloaliphatic tertiary amine and/or a compound having a heterocyclic ring containing one or two N atoms, such as quinuclidine.

#### New Iridium Compounds

INTERNATIONAL NICKEL CO. *U.S. Patent* 4,174,378

Novel Ir compounds are prepared by refluxing a diammonium hexahalogen salt of Ir and sulphamic acid in an aqueous medium for more than thirty hours. The Ir products are useful in electroplating.

## **Straight Chain Amine Complexes of Platinum(IV)**

RUSTENBURG PLATINUM MINES LTD.

*U.S. Patent 4,182,724*

A Pt chloro co-ordination complex containing two alkylamine groups is claimed. Trans-dihydroxy complexes are described in the body of the specification but are not claimed.

## **ELECTROCHEMISTRY**

### **Sodium Hypochlorite Production**

CHLORINE ENGINEERING CORP. LTD.

*British Patent 1,559,957*

Na hypochlorite can be produced efficiently by electrolysis of NaCl in a cell without a diaphragm, if the ratio of anode area to cathode area is at least 1.5:1. Ru oxide/Ti oxide coated electrodes are used in the examples.

### **Electrolytic Cell Construction**

DIAMOND SHAMROCK CORP.

*British Patents 1,561,956/7/8*

A monopolar membrane electrolytic cell with an improved flange type of construction may be used for brine electrolysis. The electrodes consist of valve metal bodies coated with platinum group metals or their oxides.

### **Hydrogen Production**

ENERGY DEVELOPMENT ASSOCIATES INC.

*U.S. Patent 4,182,662*

A cell for the production of H<sub>2</sub> by the electrolysis of a halogen acid (HCl or HI acid) has a reaction zone where halogen released by the cell reacts with water, to form additional halogen acid. Ruthenised Ti and platinised Ti catalysts are suitable for the rapid hydrogenation reaction required.

## **ELECTRODEPOSITION AND SURFACE COATINGS**

### **Noble Metal Ion-Plated Titanium**

U.S. SECRETARY OF THE AIR FORCE

*U.S. Patent 4,181,590*

Ti and Ti alloys having outstanding resistance to oxidation and mechanical properties at high temperature are obtained by ion plating the alloy with Ru, Rh, Pd, Os, Ir, Pt or Au. The alloys are used for fabricating turbine blades of jet engines.

## **LABORATORY APPARATUS AND TECHNIQUE**

### **Exhaust Emission Sensor**

LUCAS INDUSTRIES LTD. *British Patent 1,562,623*

A metal oxide and a temperature sensor located on a ceramic substrate are used to monitor exhaust emissions from an I.C.E. In examples, a sensor containing Ti dioxide, Ta oxide and 1% Pt overprinted with a Pt resistance thermometer is used.

### **Vapour Heating Apparatus**

LAPORTE INDUSTRIES LTD. *British Patent 1,564,747*

A vapour heater for converting corrosive Ti tetrachloride vapour to TiO<sub>2</sub> consists of an Al<sub>2</sub>O<sub>3</sub> casing having an embedded Pt or Pt alloy element. Connections to the element are via flexible Pt, Pt alloy or Ta couplings.

### **Prevention of Cast Iron Corrosion**

HOECHST A.G. *British Patent 1,564,774*

Cast iron boilers used in the treatment of concentrated H<sub>2</sub>SO<sub>4</sub> tend to corrode even when anticorrosion additives of the amine type are present. This corrosion is now avoided by the presence in the system of a noble metal. Pd, Pt and Au are the preferred metals and may be used in the form of wire or chips attached to the cast iron surface.

### **Temperature Change Detector**

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

*British Patent 1,565,901*

The temperature inside a nuclear reactor, is monitored by a source which releases radioactive gas at a temperature dependent rate. The radioactive gas is collected by the cooling gas and passed to a trapping system where it is detected. The source may conveniently be Ra-226 deposited on a Pt foil.

### **Carbon Dioxide Gas Laser**

SECRETARY OF STATE FOR DEFENCE

*British Appl. 2,028,571 A*

A Sn oxide-supported Pd or Pt catalyst contained in a porous SiO<sub>2</sub> or Al<sub>2</sub>O<sub>3</sub> structure mounted within the envelope of a CO<sub>2</sub> gas laser recombines CO and O<sub>2</sub> produced during operation of the laser.

### **Soot Detector**

ROBERT BOSCH G.m.b.H. *British Appl. 2,029,028 A*

A sensor for detecting the presence of soot in diesel exhausts, has an Al<sub>2</sub>O<sub>3</sub> body and two Pt electrodes bridged by a non-conductive layer carrying a catalyst, such as a Pt catalyst. Soot deposits on the bridge and decreases the resistance between the electrodes; and when the gas becomes soot free the catalyst oxidises the soot enabling the resistance to be restored.

### **Humidity Detector**

MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD.

*European Appl. 9,825*

A humidity detector, for detecting steam leaks, includes a humidity-sensitive resistor which is a plate like metal oxide ceramic (Cr oxide, Mg oxide or TiO<sub>2</sub>) provided with a pair of electrodes (RuO<sub>2</sub>) and Pt wire leads.

### **Oxygen Sensor**

NATIONAL RESEARCH DEVELOPMENT CORP.

*U.S. Patent 4,182,666*

A molten electrolyte O<sub>2</sub> sensor has a Pt/Pt oxide reference electrode, a Pt counter electrode and a Ag

metallised PTFE membrane oxygen diffusion electrode. Metal/metal oxide electrode systems of other noble metals, particularly Au and Ag, may also be used.

### Ion-Sensitive Electrode

NATIONAL RESEARCH DEVELOPMENT CORP.

*U.S. Patent 4,182,667*

Ion-sensitive electrodes are formed from a solid mercury amalgam protected by a layer of  $\beta$ - $\text{Al}_2\text{O}_3$ . Connections are made to the active amalgam layer by means of Pt disc electrodes. The electrodes may be used for Ag ion measurements, among others.

### Oxygen Sensors

ROBERT BOSCH G.m.b.H. *German Offen. 2,830,778*

An oxygen cell includes a solid electrolyte, preferably Zr oxide stabilised with about 5%  $\text{Y}_2\text{O}_3$  and protected by a porous layer of Mg-Al spinel, and electrodes of Pt or Pt-Rh alloy.

## JOINING

### Hot Cathode for Thermionic Tubes

BBC BROWN BOVERI & CO. LTD.

*British Appl. 2,027,263 A*

A wire or sheet cathode made by a powder metallurgical/hot swaging process has core and shell portions formed from a carrier metal, Mo, containing small amounts of lanthana, yttria and thoria as activators, greater amounts of the activators being used in core portion. Both portions are joined, carburised and coated with a platinum group metal diffusion promoting additive to form the cathode.

### Cermets

JOHNSON MATTHEY & CO. LTD. *U.S. Patent 4,183,746*

The ceramic ( $\text{Al}_2\text{O}_3$ ) particles of a cermet containing a platinum group metal, Ag or Au as the metallic phase are coated with a second metal (Y, Al, Ti, V, Cr or Ni) to improve the adhesion between the ceramic and metal phase. The cermets are useful as erosion-resistant materials in glass melting.

## HETEROGENEOUS CATALYSIS

### Hydrogenation of Hydrocarbons

BRITISH PETROLEUM CO. LTD.

*British Patent 1,563,168*

Lubricating oils of low aromatic content are obtained by hydrogenating hydrocarbon fractions having a distillation end point above  $350^\circ\text{C}$  and a S content of 1,000–3,000 ppm over a catalyst which is Pt deposited on a  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$  support containing  $\text{SiO}_2$ .

### Catalytic Waste Heat Recovery

JOHNSON MATTHEY & CO. LTD.

*British Appl. 2,027,609 A*

Heat energy may be recovered from waste or effluent gases, such as exhaust gases, containing combustible vapour or droplets by catalytically oxidising the

vapour or droplets over a platinum group metal catalyst and removing the heat produced via a heat exchanger.

### Catalytic Cracking

MOBIL OIL CORP.

*European Appl. 7,734*

The efficiency of CO combustion in a regenerator is considerably increased by the periodic addition to the circulating catalyst of a mixture of metal-rich and metal-free particles. The metal-rich particles preferably contain about 50 ppm of Pt, Pd, Ir, Os, Rh, Ru or Re, the total concentration of metal in the mixture being 1–10 ppm. The activity of this mixture is higher than that of a catalyst in which the same amount of metal is evenly distributed among the particles.

### Chloronitrobenzene Hydrogenation

DYNAMIT NOBEL A.G.

*European Appl. 7,972*

Chloro-hydrazobenzenes are obtained by the hydrogenation of the corresponding nitrobenzenes in a turbulent alkaline aqueous-organic medium in the presence of a Pd or Pt catalyst and optionally a naphthoquinone as a co-catalyst.

### Oxidation Resistant Coatings

JOHNSON MATTHEY & CO. LTD. *European Appl. 9,494*

An I.C.E. exhaust gas purification catalyst consists of a metal substrate which is not normally oxidation resistant at high temperatures, coated with an oxidation-resistant layer of Al powder in a ceramic binder, a high surface area washcoat and a catalytically active platinum group metal.

### Palladium Catalyst

E. I. DU PONT DE NEMOURS & CO. *European Appl. 9,802*

A Pd catalyst supported on amorphous  $\text{SiO}_2$  also contains a small amount of an additive chosen from oxides, hydroxides and carbonates of Zr, Th, Hf, Ce, Ti and Al. The products are useful as hydrogenation catalysts, particularly in a cyclic process for the manufacture of  $\text{H}_2\text{O}_2$ .

### Catalytic Heaters

COMSTOCK & WESCOTT INC. *U.S. Patent 4,171,947*

A catalytic combustion apparatus for heating shaving foam dispensed from aerosol cans, which has rapid cold ignition and which is effective when the catalyst is damp, operates on lower alcohol fuel and has a higher catalyst concentration around the fuel inlet. Pellets coated with up to 60% of a platinum metal are used in the inlet areas, whereas the catalytic content of pellets in other areas of the combustor is 2%.

### Rhodium Exhaust Gas Purification Catalysts

FORD MOTOR CO.

*U.S. Patent 4,172,047*

Rh optionally mixed with other catalytic metals, is coated on to a substrate carrying an  $\alpha$ - $\text{Al}_2\text{O}_3$  wash coat. Rh is not dissolved into  $\alpha$ - $\text{Al}_2\text{O}_3$  when the catalyst is used under the oxidising conditions employed, that is high temperature conditions.

### Reactivation of Iridium Catalysts

EXXON RESEARCH & ENGINEERING CO.

*U.S. Patent 4,172,817*

The time required to reactivate an Ir-containing hydroforming catalyst (deactivated by coke deposition) is reduced by deliberate agglomeration of the Ir prior to sequential reduction/halogenation treatments. Agglomeration may be achieved by a severe coke burn. The method may be used with catalysts containing Pt, Ir and halogen.

### Ruthenium Cerium Hydrogenation Catalysts

PHILLIPS PETROLEUM CO.

*U.S. Patent 4,172,849*

The addition of Ce to a Ru hydrogenation catalyst, particularly catalysts used for the hydrogenation of unsaturated dinitriles, moderates the catalyst degradation and the loss of activity.

### Multimetallic Dehydrogenation Catalysts

U.O.P. INC.

*U.S. Patent 4,172,853*

Non-acid catalysts for the preparation of high octane petrols, contain a platinum group metal, a Group IVA metal, a Group IA or IIA metal and a sufficient amount of a lanthanide metal to give a Pt:Ln ratio between 0.01:1 and 1.25:1. Pt-Sn-Nd-Li combinations are used in examples.

### High Severity Reforming

CODSEN TECHNOLOGY INC. *U.S. Patents 4,174,270/1*

Highly aromatic reformates are produced from naphtha feeds by high severity reforming using a reforming catalyst containing a hydrocracking promoter metal, typically a Pt-halogen catalyst containing Ir, Sc, Y or other metals as promoters.

### Catalytic Cracking

MOBIL OIL CORP.

*U.S. Patent 4,174,272*

Non-hydrogenative endothermic cracking of hydrocarbons, at low pressure and high temperature, uses heat supplied by the catalyst as a heat transfer medium. Platinum group metal catalysts, such as Pt or Pd, are heated by burning deposited coke formed during the cracking process.

### Oxidation Over Synthetic Amorphous Silicas

MOBIL OIL CORP.

*U.S. Patent 4,176,161*

An economical catalyst having shape-selectivity for hydrocarbon conversion is prepared by hydrolysing and polymerising a specified silane, optionally in the presence of a metallic compound, preferably a Pt and/or Pd compound.

### Rhodium or Palladium Hydroalkylation Catalyst

PHILLIPS PETROLEUM CO.

*U.S. Patent 4,177,165*

A catalyst consisting of a Pd or Rh compound supported on a calcined, acidic, Ni and lanthanide metal-exchanged zeolite is effective for hydroalkylation reactions.

### Sulphided Platinum-Rhenium Catalyst

U.O.P. INC.

*U.S. Patent 4,178,268*

A selective sulphided catalytic composite for hydrocarbon conversion contains 0.01–2% of a platinum group metal (Pt), 0.01–2% of sulphided Re and 0.1–3.5% of a halogen component supported on a Ziegler  $Al_2O_3$  carrier.

### Steam Cracking of Heavy Feedstocks

INSTITUT FRANCAIS DU PETROLE

*U.S. Patent 4,180,453*

A fresh charge containing aromatic hydrocarbons is hydrotreated mixed with a recycle fraction in the presence of a dual-function catalyst, which preferably contains Pd or another platinum group metal. A portion of the effluent is subjected to steam cracking so that a gas oil recycle fraction may be obtained.

### Ruthenium-Containing Perovskite Catalyst

E. I. DU PONT DE NEMOURS & CO. *U.S. Patent 4,182,694*

The B site of a perovskite catalyst of type  $ABO_3$  contains up to 10% Ru and up to 20% of another platinum group metal. La and Sr are preferred metals for site A. The catalyst may be used for I.C.E. purification and for  $HNO_3$  tail gas decomposition.

### Platinum-Catalysed Curable Organopolysiloxanes

TORAY SILICONE CO. LTD.

*U.S. Patent 4,182,824*

A composition, based on the Pt-catalysed  $SiH_4$  addition to unsaturated groups on Si, contains specified silanes to enhance adhesion of the organopolysiloxane to substrates.

### Palladium and Platinum-Copper Catalysts for Dialkyl-N-Alkylaniline Preparation

CIBA-GEIGY CORP.

*U.S. Patent 4,183,868*

Addition of up to 10% Pd or Pt to Cu catalysts used for the preparation of 2,6-dialkyl-N-alkylanilines considerably increases the product yield.

### Catalysts for Processing Synthesis Gas

HOECHST A.G.

*German Offen. 2,825,495*

Ethanol, acetaldehyde and acetic acid are obtained by the reaction of Co with  $H_2$  in the presence of a supported mixture of Rh and Mg.

### Metal Fibre Catalysts

W.C. HERAEUS G.m.b.H.

*German Offen. 2,829,035*

Catalysts which are bundles or webs of Pt, Ag, Rh and/or Pd wires (especially wires of Pt with 5–10% Rh) are used in the oxidation of  $NH_3$  or the synthesis of formaldehyde or HCN.

### Isomerisation Catalyst

BASF A.G.

*German Offen. 2,830,998*

A catalyst for the isomerisation of *trans*-to *cis*-2,6-dimethyl morpholine is  $Al_2O_3$  supporting 5% lanthanide metal oxide and 0.5% Pd.

## Selective Hydrogenation of Aldehydes

BASF A.G. *German Offen.* 2,832,699

The selective hydrogenation of olefinic aldehydes to saturated aldehydes is catalysed by 2–90% Pd and 10–98% lanthanide oxide(s) and/or salt(s).

## Catalytic Hydrogenation

JOHNSON MATTHEY & CO. LTD.

*German Offen.* 2,922,755

The solubility of supported Pd, used as a catalyst for the reduction of nitroaromatic compounds with H<sub>2</sub>, is reduced by maintaining a continued excess of H<sub>2</sub> in the reaction medium, with part of the H<sub>2</sub> reversibly absorbed on the Pd surface.

## Hydrocarbon Synthesis

JOHNSON MATTHEY & CO. LTD.

*German Offen.* 2,924,139

5–12C Hydrocarbons can be obtained from synthesis gas with good selectivity in the presence of a Ru catalyst, especially Al<sub>2</sub>O<sub>3</sub> coated with 0.5% Ru.

## Smoke Control for Diesels

JOHNSON MATTHEY & CO. LTD.

*German Offen.* 2,927,815

Finely divided particles of C and/or hydrocarbon material in gas streams such as furnace stack gases, are oxidised by mixing with a turbulent stream of O<sub>2</sub>-containing gas and passing through a catalyst bed. The catalyst consists of a porous ceramic or fine metal wire support, coated with a platinum group metal or its alloy, especially 7.5% Rh-Pt.

## HOMOGENEOUS CATALYSIS

### Hydroformylation Catalyst

KURARAY CO. LTD. *British Appl.* 2,026,473 A

The life of a catalyst consisting of Rh, such as a Rh carbonyl phosphine, used in the hydroformylation of olefins may be prolonged by the presence of a phosphine oxide, such as Ph<sub>2</sub>P(H)O.

### Hydroformylation Catalysts

RUHRCHEMIE A.G. *European Appl.* 7,609

Secondary aliphatic aldehydes are obtained by reacting terminal olefins with CO and H<sub>2</sub> in the presence of a Rh carboxylate and a tertiary phosphine.

### Hydrogenation Catalysts

HEYL & CO. *European Appl.* 8,407

Catalysts useful in a wide range of organic hydrogenation reactions are polymer-bonded complexes of Group VIII metals, particularly Pd and Pt, such as Pd chloride bonded to polyvinyl alcohol.

### Rhodium Hydroformylation Catalysts

BAYER A.G. *European Appl.* 8,763

The hydroformylation of cyclododecatrienes is catalysed by a mixture of dicobalt octacarbonyl and a Rh complex, tris(dibenzyl sulphide) trichloro Rh.

## Undecadienes

RHONE-POULENC INDUSTRIES *European Appl.* 9,429

Undecadienes containing functional groups, useful intermediates in the manufacture of biodegradable detergents, are obtained by reaction of a diene bearing functional group, such as acetoxystyrene, with a conjugated diene, such as butadiene, in the presence of a catalyst system consisting of a Rh compound (chloride) and a tertiary phosphine, in the atomic ratio P:Rh preferably 2-6:1.

## Palladium Complex Catalyst for Unsaturated Aliphatic Ester Production

TEXACO DEVELOPMENT CORP. *U.S. Patent* 4,172,087

A dual function homogeneous Pd complex containing certain organic tertiary nitrogen bases is useful for the selective production of fatty acid derivatives from 1,3-butadiene.

## Rhodium Catalyst for Production of Alkane Polyols

UNION CARBIDE CORP. *U.S. Patent* 4,180,517

A new Rh carbonyl phosphido cluster complex, having a Rh<sub>3</sub>PC(CO)<sub>21</sub> anion, is active for the production of polyhydric alcohols from synthesis gas.

## CHEMICAL TECHNOLOGY

### Thermally Developable Photographic Material

FUJI PHOTO FILM CO. LTD. *British Patent* 1,560,459

A thermally developable material is based on Ag behenate or another organic Ag salt with Rh or other metal salts to modify its crystal size and shape. Au and platinum group metal sensitizers may be present.

### Neutron-Absorbing Silicone Rubber

H.L. ZOCH *U.S. Patent* 4,176,093

Pt-catalysed Si-rubber compositions containing a silanol or vinylic diorganopolysiloxane polymer of B carbide and vulcanise at room temperature are useful shielding materials for nuclear plant.

### Metal Phosphinate Polymers as Flame Retardants for Polyester Resins

PENNWALT CORP. *U.S. Patent* 4,180,495

Poly(metal phosphinates) of Pt, Pd, Rh, Ir, Ru and Ag, among others, may be added to polyesters and polyamides to increase their flame resistance.

### Palladium and Platinum Azo Dyes

EASTMAN KODAK CO. *U.S. Patents* 4,183,753/4/5

The Pt, Pd and other metal complexes of three types of azo dyestuff for use in photographic elements are disclosed. A suitable dye is, for example, the Pt complex of the reaction product of 3(1-acetyl-6-methyl-1H-pyrazolo(3,2-c)-s-triazol-3-yl)-4-methoxy-aniline and 4(m-chloro-sulphonylbenzene sulphonamido)-1-hydroxy-[4(2,6-di-t-pentylphenoxy)butyl] naphth-2-amide.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Growing Single Crystals

PHILIPS ELECTRONIC & ASSOCIATED INDUSTRIES LTD.  
*British Patent 1,561,090*

A spherical or ellipsoidal crucible is used to grow single crystals. The crucible can be rotated without setting the liquid in motion, enabling undisturbed growth to be obtained. The crucible is preferably fabricated from Pt and may be used for growing Y oxide containing crystals.

### Photovoltaic Generator for Solar Energy Conversion

TEXAS INSTRUMENTS INC. *British Patent 1,561,309*  
Transparent Pt and Pd electrodes are used in a solar energy converter in which a series of semiconductor solar generators are operated directly in communication with, and are wetted by, an electrolyte to force a chemical reaction.

### Igniter Electrode

GENERAL ELECTRIC CO. *British Patent 1,564,335*  
An igniter electrode for use in gas turbines is made from an alloy consisting of 2-16 vol.% Y, Th or a lanthanide oxide the balance being Ru and/or Ir or alloys based on Ru or Ir. A preferred electrode contains 4-8 vol.% Y<sub>2</sub>O<sub>3</sub> and the balance Ru.

### Conductive Pyrochlore Compounds

EXXON RESEARCH & ENGINEERING CO.  
*British Appl. 2,029,385 A*

New pyrochlore conductors for use in oxygen electrodes have the formula A<sub>2</sub>B<sub>2</sub>O<sub>7-y</sub> where y is between 0 and 1, A is Pb and/or Bi and B is Ru and/or Ir. A suitable catalyst is Pb<sub>2</sub>Ru<sub>2</sub>O<sub>7-y</sub> applied to a Au screen.

### Non-Aqueous Secondary Cells

WESTERN ELECTRIC CO. INC.  
*British Appl. 2,030,352 A*

Non-aqueous secondary cells having rutile transition metal oxide positive material and Li negative material are claimed. Ru, Ir and Os oxides rutile materials are used in examples.

### Magnetic Alloys

XEROX CORP. *European Appl. 7,5755*

A magnetic thin film with high coercivity and a high squareness B-H hysteresis loop for a high-density magnetic recording medium is obtained by vacuum deposition of a Co-base binary or ternary alloy containing preferably 5-15 at.% Re, Ru and/or Os.

### Insulated Gate FETS

INTERNATIONAL BUSINESS MACHINES CORP.  
*U.S. Patent 4,173,818*

Pd silicide-Al metallisation may be used in an improved method of fabricating IGFETS having very short effective channel lengths.

## Superconductor Filament Manufacture

U.K. ATOMIC ENERGY AUTHORITY  
*U.S. Patent 4,177,087*

A superconducting fine wire filament of the A<sub>3</sub>B type is manufactured by forming component filaments in a bronze matrix having specified additives, drawing the compact and reacting the components to form the superconductor. The superconductor is primarily Nb<sub>3</sub>Sn, although component B metals claimed include Rh, Pd, Os and Ru.

### Multi-Refractory Films for Gallium Arsenide Semiconductors

U.S. SECRETARY OF THE NAVY *U.S. Patent 4,179,533*  
Individually deposited layers of Ta-Pt-Ta, W-Pt-W or TiW alloy-Pt refractory layers prevent grain boundary migration of electrode Au layers in GaAs semiconductors and produces devices which are thermally stable up to 600°C.

### Solid Electrolyte Capacitor

MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD.  
*U.S. Patent 4,184,192*

Use of Ru, Rh, Pd, Re, Os and/or Ir oxides instead of colloidal C as the cathode collector layer of a solid electrolyte capacitor (such as a MnO<sub>2</sub> capacitor) improves the dielectric loss and the frequency-capacitance characteristics of the capacitor.

## MEDICAL USES

### Platinum Bisamine Complexes

JOHNSON MATTHEY & CO. LTD.  
*British Appl. 2,025,938 A*

The treatment of tumours or neoplasms may be carried out with complexes of divalent Pt salts and two molecules of the same or different straight chain amines, such as *cis*-bis(bromoacetato)bis(*n*-propylamine)Pt (II).

### Dental Silicone Compositions

G.-C. SHIKA K.K. *British Appl. 2,026,000 A*

When using catalysed organovinyl polysiloxane-based compositions for making dental impressions, the moulding may be affected by H<sub>2</sub> evolution. A smoother cast is obtained when Pd or Pd alloy powder is present to absorb the H<sub>2</sub>. The curing catalyst may be a Pt compound.

### Platinum Antileukaemia Complexes

UNITED STATES OF AMERICA *U.S. Patent 4,175,133*  
1,2-Diaminocyclohexane Pt complexes, such as hydroxymalonato(diaminocyclohexane)Pt, are used for the treatment of L1210 leukaemia.

### Palladium Dental Alloy

NEOLY PRODUCTS INC. *U.S. Patent 4,179,288*  
An alloy for firing on to dental porcelain contains 7-12% Ga, 2-5% Au, 0.125-0.5% B and the balance Pd. A preferred alloy contains 89.875% Pd, 2% Au, 8% Ga and 0.125% B.