

## GLASS TECHNOLOGY

### An Electrochemical Theory for Oxygen Reboil

J. H. COWAN, W. M. BUEHL and J. R. HUTCHINS,  
*J. Am. Ceram. Soc.*, 1966, **49**, (10), 559-562

O<sub>2</sub> reboil with the development of O<sub>2</sub> blisters may occur during glass melting in air in Pt vessels but can be reduced by elimination of electron conductors from the system, removal of O<sub>2</sub> from the atmosphere above the melt, application of an external bucking potential, reversal of concentration gradients, and removal of temperature gradients. A mechanism for the phenomenon is proposed.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Influence of Platinum Group Metal Films on Oxide Cathode Emission

YU. A. VOLODIN, A. V. DRUZHININ and V. A. SMIRNOV, *Radiotekh. Elektron.*, 1966, **11**, (12), 2262-2265

Thermionic emission from an heated cathode can be controlled by coating with Pt, Ir, or Os, which suppress emission from the coated areas. 0.3-0.5 $\mu$  coatings of Ir reduce emission from an

oxide cathode by 300 times, 0.3-0.5 $\mu$  Pt by 10 times, 0.01 $\mu$  Os by 100 times.

## TEMPERATURE MEASUREMENT

### Survey of Thermocouples

C. P. SMITH, *Engng. Materials Design*, 1966, **9**, (12), 1966-1970

A survey of base and Pt metal thermocouples, with the instrumentation required and factors to be considered in selection and installation. A guide to fifty-one British thermocouple manufacturers is included.

### Use of Noble Metals and Noble Metal Alloys for Temperature Measurement

S. LANDOR, *Mérés Automat.*, 1966, **14**, (3), 85-88  
Values of thermal e.m.f. E<sub>x</sub> are tabulated against temperature t for Pt:10-100% Rh-Pt thermocouples and for Pt:0-100% Au-Pd thermocouples. Data for combinations of Pt with Pt-Mo, Pt-W, Pt-Re, Pt-Os, Pt-Co, Pt-Cu, Pt-Ir and Pt-Pd-Au are presented graphically. Advantages of various thermocouple alloys are discussed in relation to E<sub>x</sub> and to physical properties. Some discrepancies exist between these experimental results and accepted British figures.

## NEW PATENTS

### METALS AND ALLOYS

#### Composite Metal

DEUTSCHE GOLD- & SILBER- SCHEIDEANSTALT  
*British Patent* 1,051,994

Better adherence of Pt to Ti is achieved when the Ti is pickled in a solution which is at least 10 N in H<sup>+</sup> and 10 N in Cl<sup>-</sup> until a dark grey covering layer is formed and a metal of the Pt group is firmly bonded to the treated substrate by cold welding with a reduction in thickness of at least 25%.

#### Ruthenium Alloys for Powder Metallurgy

THE INTERNATIONAL NICKEL CO. INC.  
*U.S. Patent* 3,278,280

A liquid-phase sintered alloy which has powder metallurgy applications comprises 5-35 wt.% Au, 5-35 wt.% Pd and the balance Ru.

#### Magnetic Platinum Metal Alloys

E. I. DU PONT DE NEMOURS & CO.  
*U.S. Patent* 3,279,914

A new alloy consists of 20-75% Mg, 20-62% Ge and 1-35% Pd and/or Rh.

#### Ruthenium Alloys

INTERNATIONAL NICKEL LTD.  
*French Patent* 1,438,650

Alloys which are extremely useful in powder metallurgy comprise 0.25-2.5 wt.% Re and the balance Ru.

#### Iridium Alloy for Springs

INTERNATIONAL NICKEL LTD.  
*German Patent* 1,224,936

A suitable alloy for springs exposed to temperatures of 500°C and more consists of Ir with 0.5-7%, especially 2-7% W.

## CHEMICAL COMPOUNDS

### Production of Trimeric Ruthenium Tetracarbonyl

LONZA LTD. *British Patent* 1,047,794

Trimeric Ru(CO)<sub>3</sub> is produced by reacting an enolisable Ru compound or basic Ru carboxylate with CO and H<sub>2</sub> in the presence of an organic solvent, at 100-250°C and 50-350 atm.

## ELECTROCHEMISTRY

### Hot Electrodes for Electrode Systems

LEYBOLD HOLDING A.G. *British Patent 1,047,290*  
A hot electrode operating at elevated temperatures in O<sub>2</sub>-containing gases is suspended between connections on two electrode holders and has intermediate members made of Ir or Ir-Pt alloy interspersed between the holders. These intermediate members are so dimensioned that they ensure that the electrode temperature is maintained above the temperature range within which the electrode material forms oxides.

### Electrolytic Anode

E. M. NELSON *U.S. Patent 3,278,410*  
An electrolytic anode for cells in which Cl<sub>2</sub> or Cl<sub>2</sub>-containing radical are formed comprises a screen-brazing made of Ti coated with Pt and loose graphite particles arranged within the housing so that at least some bear against the Pt-coated screen.

### Platinised Titanium Anode

FARBENFABRIKEN BAYER A.G. *German Patent 1,225,618*  
A Cl<sub>2</sub> electrolysis cell is fitted with a Ti anode which is provided with an electrochemically active Pt layer on the amalgam side.

## ELECTRODEPOSITION AND SURFACE COATINGS

### Deposition of Gold-Palladium Alloys

TECHNIC INC. *British Patent 1,051,383*  
The new bath contains Au as a cyanide, a suitable buffering salt, a Pd compound other than a cyanide, e.g. a complex or chelate, and acid or alkali to adjust the pH.

### Metallised Ceramic Members

CIE. FRANCAISE THOMSON-HOUSTON *U.S. Patent 3,265,473*  
A metallised ceramic structure comprises a ceramic body, a metallised layer of highly refractory material bonded to it, e.g. Mo, a layer of Rh, Pt or Ir or their combinations and an outer layer of Au.

### Electroless Plating with Platinum Group Metals

AMALGAMATED CURACAO PATENTS CO. N.V. *U.S. Patent 3,265,526*  
Glass, C, steel, Fe, Ti, Ni, etc. are coated with Pt group metals or their alloys, by applying on them at least one reducible salt of the plating metal, heating in a gaseous mixture of reducing and alkaline reagents and ensuring that decomposition of the metal salt takes place without the substrate being damaged.

### Electroless Deposition of Palladium

THE INTERNATIONAL NICKEL CO. INC. *U.S. Patent 3,274,022*  
A bath for the electroless deposition of Pd comprises an aqueous solution containing 1-20 g/l Pd(II), 0.04-0.5 g/l unsymmetrical dimethylhydrazine, an organic amine in a molar concentration equivalent to 100-350 g/l NH<sub>4</sub> and up to 80 g/l NH<sub>4</sub>Cl or (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> or EDTA as stabiliser.

## BRAZING

### Brazing Alloys for Tungsten and Molybdenum

UNITED STATES ATOMIC ENERGY COMMISSION *British Patent 1,049,957*  
A brazing alloy for joining W, Mo and their alloys comprises 42-95% Mo, 5-44 wt.% Rh and 0-45 wt.% Re.

### Brazing of Tungsten

U.S. SECRETARY OF THE NAVY *U.S. Patent 3,276,113*  
W elements are joined together at low temperatures by placing between the elements an alloy of 1-4.5 wt.% B and the balance Pt, heating the assembly to at least 2,000°F at minimum rate of 25°F/min and then brazing the elements together for 5-60 sec at about 2,000°F.

### Palladium-based Brazing Alloys

THE INTERNATIONAL NICKEL CO. INC. *U.S. Patent 3,277,150*  
Brazed metallic bonds are produced between articles of which at least one is made of an insulating ceramic material, by using a brazing alloy comprising 2-9 wt.% Ti, 30-75 wt.% Pd and the balance Ni.

### Alloys for Brazing Tungsten and Molybdenum

UNITED STATES ATOMIC ENERGY COMMISSION *French Patent 1,440,987*  
An alloy for brazing together Mo, W and their alloys comprises 40-87 wt.% Mo, 5-40 wt.% Ru and 8-55 wt.% Re. The brazing operation is effected at 1,950-2,500°C.

## LABORATORY APPARATUS AND TECHNIQUE

### Stabilising Metal Surfaces, Especially of Platinum Metals Heated at High Temperature

J. FUKA *Czech Patent 117,397*  
An Al<sub>2</sub>O<sub>3</sub> layer, formed by treatment of Al compounds on the surface of a Pt conductor, prevents evaporation of Pt at 900-1,250°C when determining CH<sub>4</sub> or CO based on their infra-red radiation absorbancy. Most emitted Pt molecules

then remain within the  $Al_2O_3$  protective layer, participate in conduction of the current and improve the element's stability.

## CATALYSIS

### Cyclic Acetals and Ketals and their Preparation

SHELL INTERNATIONALE RESEARCH MIJ. N.V.

*British Patent 1,046,608*

A cyclic acetal or ketal is produced by heating a glycol with an aldehyde or ketone at  $140-220^\circ C$  in the presence of a catalyst comprising 0.5-15 wt. % supported Rh, Ir, Pd or Pt.

### Continuous Production of Hydroxylammonium Salts

BADISCHE ANILIN- & SODA-FABRIK A.G.

*British Patent 1,046,656*

An improved process for the production of hydroxylammonium salts utilises, as catalyst, 0.3-5 wt. % Pt/C.

### Selective Hydrogenation of Cycloalkenes

THE GEIGY CO. LTD. *British Patent 1,046,780*

An improved process for the selective hydrogenation of cycloalkenes is carried out in the presence of Pd black or Pd supported on  $SiO_2$ ,  $Al_2O_3$ , pumice, etc.

### Catalytic Oxidation of Ethylenically Unsaturated Compounds

CELANESE CORPORATION OF AMERICA

*British Patent 1,047,172*

Carbonyl compounds are produced by the oxidation with  $O_2$  of an ethylenically unsaturated compound at  $20-90^\circ C$ , 1-5 atm in the presence of an aqueous solution containing ions of a Pt group metal and  $NO_3$  or  $NO_2$  ions.

### Preparation of Alkenyl Acetate

SHELL INTERNATIONALE RESEARCH MIJ. N.V.

*British Patent 1,047,835*

Alkenyl acetate is produced by reacting an up to 4C straight chain olefine with Ru, Rh, Pd, Os, Ir or Pt acetate in the presence of  $H_2O$  so that the desired alkenyl acetate is formed, oxidising the aldehyde and/or ketone formed during this reaction to  $CH_3COOH$  and using this  $CH_3COOH$  together with  $O_2$  to regenerate the reduced precious metal acetate.

### Catalysts

ESSO RESEARCH & ENGINEERING CO.

*British Patent 1,047,933*

A finely divided metal alloy is produced by adding a solution of a Pt salt, a second metal salt and optionally a third metal salt to a  $NaHB_4$  solution and selecting the other metals from Ru, Rh, Pd, Os, Ir, Au, Ag, Fe, Co, Ni, Mn, Re, Mo, W, Cu, Cd, Zn, Cr, Ti or V.

### Activity Maintenance of Hydrocracking Catalyst

ESSO RESEARCH & ENGINEERING CO.

*British Patent 1,048,343*

A catalyst comprising crystalline alumino-silicate zeolite containing less than 10%  $Na_2O$ , having pore size 6-15Å and activated by a Pt group metal, is reactivated by contacting it with  $H_2$  at  $600-1,000^\circ F$ .

### Indole Derivatives

MERCK & CO. LTD.

*British Patent 1,050,730*

Indolyl aliphatic acids are produced by hydrolysing a suitable indole acetal and oxidising the resulting aldehyde with  $Ag_2O$  or  $PtO_2$  in an inert solvent. See also 1,050,731-1,050,740.

### Catalyst and Process for Reforming Hydrocarbons

UNIVERSAL OIL PRODUCTS CO.

*British Patent 1,052,892*

A gasoline boiling range fraction is catalytically reformed using a reduced composite of a refractory metal oxide, a Group VIII metal and combined halogen, e.g. Pt and  $Cl_2$  on  $Al_2O_3$  support.

### Production of Carboxylic Acid Esters of Unsaturated Monohydric Alcohols

IMPERIAL CHEMICAL INDUSTRIES LTD.

*British Patent 1,053,421*

These esters are obtained by contacting an olefine with a liquid mixture containing a Pd salt other than a fluoride, a carboxylate which is ionised in the reaction conditions, a redox system, a carboxylic acid and less than 5 wt. %  $H_2O$ .

### Production of Unsaturated Carboxylic Acids

IMPERIAL CHEMICAL INDUSTRIES LTD.

*British Patent 1,054,132*

Unsaturated acids are oxidised with  $O_2$  in the presence of a Pd salt, a Cu or Fe salt and a nucleophile ( $H_2O$  or carboxylate ions).

### Preparation of Diols

THE BRITISH PETROLEUM CO. LTD.

*British Patent 1,054,173*

Pd/C is a far more selective catalyst for the hydrogenation of epoxy alcohols to diols than many conventional hydrogenation catalysts.

### Copolymerisable Organosilicon Compositions

GENERAL ELECTRIC CO. *British Patent 1,054,658*

Pt catalysts are more easily added to silicon compositions in the form of a ligand with a N compound, e.g., picoline or  $C_6H_5N$ .

### Hydrogenation of Oligomers

FARBENFABRIKEN A.G.

*British Patent 1,055,233*

Oligomers of propylene and butylene are hydrogenated in the presence of Pt and/or Pd metal deposited on a support containing no free inorganic acid or acid salt.

### Catalyst Regeneration

ALLIED CHEMICAL CORP. *British Patent* 1,055,672  
Catalysts containing Pd, which have been used in the continuous hydrogenation of organic nitro compounds, are regenerated by washing with water until the initial catalytic activity is restored.

### Platinum Group Metal Hydrocracking Catalysts

UNION OIL COMPANY OF CALIFORNIA  
*U.S. Patent* 3,267,022

Hydrocarbon feedstock is subjected to hydrocracking over a fixed bed catalyst consisting of zeolite of 6–14 Å pore size supporting a Pt group metal catalyst and at least 10 wt.% Al<sub>2</sub>O<sub>3</sub>, MgO, SiO<sub>2</sub> and/or H<sub>2</sub> clays.

### Zeolite-Platinum Group Metal Hydrocracking Catalysts

MOBIL OIL CO. *U.S. Patent* 3,267,023

An improved hydrocracking catalyst is a combination of crystalline aluminosilicate zeolite and a Pt group metal.

### Platinum Group Metal Dimerisation Catalysts

SHELL OIL CO. *U.S. Patent* 3,267,169

8–10 C 1,3,7-octatriene is produced by contacting together 8–10 C 2,7-octadienyl ether, Pt, Pd or Ru, phenoxide anion catalyst promoter and a tertiary phosphine.

### Platinum Group Metal Sulphide Catalysts

ESSO RESEARCH & ENGINEERING CO.  
*U.S. Patents* 3,267,170–1

A catalyst comprising a support and a Group VIII metal sulphide, preferably Pt or Pd sulphide, is used in the production of olefines by H transfer.

### New Noble Metal Catalyst Surfaces

E.I. DU PONT DE NEMOURS & CO.  
*U.S. Patent* 3,271,322

New catalysts comprise a film of polytetrafluoroethylene, a particulate carrier of one or more refractory metal oxides or chromites or manganites and a supported Ru, Pd, or Pt metal or oxide or Co, Ni, Ce, Ru, Pd or Pt oxide, cerate, manganate, manganite, chromate, chromite or vanadate partially carried on the surface of and partially embedded in said film.

### Supported Palladium Catalysts

AIR PRODUCTS AND CHEMICALS INC.  
*U.S. Patent* 3,271,327

Supported hydrated Pd oxide catalysts are produced by neutralising an aqueous solution of PdCl<sub>2</sub> and HCl to a pH of 4–6.5 by the addition of a base, contacting a substantially non-porous support material with the neutralised solution, wet ageing the treated support material at 70–85°F and then drying the catalyst at 140°F.

### Palladium Rehydrogenation Catalyst

ARCHER-DANIELS-MIDLAND CO.  
*U.S. Patent* 3,271,410

The quality of catalytically-hydrogenated fatty acid is improved by rehydrogenating it at 200–500°F and 10–5,000 psig in the presence of a 0.001–1 wt.% Pd supported catalyst.

### Platinum Group Metal-Zeolite Catalysts

ESSO RESEARCH & ENGINEERING CO.  
*U.S. Patent* 3,272,734

A catalyst for the hydrocracking of a hydrocarbon oil feed comprises a crystalline aluminosilicate zeolite which contains less than about 10 wt.% Na<sub>2</sub>O, has pore size 6–15 Å and is formed into a composition with 0.01–5 wt.% Pt group metal.

### Platinum Group Metal Hydrocracking Catalysts

UNIVERSAL OIL PRODUCTS CO.  
*U.S. Patent* 3,274,124

A hydrocracking catalyst is produced by commingling an alkali metal silicate solution with acid solution to form a silica sol, forming a gel and ageing it, commingling it with Al salt to form a silica-alumina composite, drying it at 200–500°F, calcining at 800–1,400°F and finally impregnating with a Pt group metal component.

### Palladium and Platinum Dioxide Hydrogenation Catalysts

NEPERA CHEMICAL CO. INC.  
*U.S. Patent* 3,274,206

Pyridine aldehydes are prepared by hydrogenating the corresponding nitriles at below 70°C, in aqueous, acidic medium and in the presence of Pd or PtO<sub>2</sub>.

### Alkylation-hydrogenation Catalysts

UNIVERSAL OIL PRODUCTS CO.  
*U.S. Patent* 3,274,276

Non-condensed cycloalkyl aromatic compounds are produced by treating an aromatic compound with H<sub>2</sub> at 25–50°C in the presence of a catalyst comprising AlCl<sub>3</sub> and Pt/C or Pd/C.

### Selective Hydrogenation Catalysts

CHEMISCHE WERKE HÜLS A.G.  
*U.S. Patent* 3,274,286

A catalyst for the selective hydrogenation of acetylenic hydrocarbons in the presence of diolefines comprises 5–50 wt.% Cu or Cu chromite, 0.01–20 wt.% Pt group metal, Zn or Ag 0.1–50 wt.% alkali or alkaline earth metal oxide or hydroxide and a carrier in amount constituting at least 40 wt.% of the mixed catalyst.

### Platinum Group Metal Dehydrogenation Catalysts

MONSANTO CO. *U.S. Patent* 3,274,287  
A catalyst for the dehydrogenation of mono-

ethylenically unsaturated hydrocarbons comprises 0.02–2.0 wt.% Pt group metal, preferably Pt or Pd, dispersed on a low acidity  $Al_2O_3$  support.

### Platinum Group Metal Hydrocarbon Conversion Catalysts

MOBIL OIL CORP. *U.S. Patent 3,276,993*

A composite catalyst for hydrocarbon conversion is produced by rolling together preformed discrete macroporous base particles with finely divided Ru, Rh, Pd, Os, Ir, Pt, Cu chromite or crystalline aluminosilicate catalyst particles until 0.5–20 wt.% of such particles are sifted into the pores of the base particles.

### Platinum Oxide Catalysts for Ethylene Polymerisation

SINCLAIR RESEARCH INC. *U.S. Patent 3,277,071*

A catalyst system for the polymerisation of  $C_2H_4$  at 70–500°F and up to 30,000 psi comprises at least 75 wt.%  $SiO_2$ , 10–30 wt.%  $Al_2O_3$  and 0.2–5 wt.% Pt group metal.

### Palladium Catalyst in the Production of Vinyl Acetate

UNION OIL CO. OF CALIFORNIA

*U.S. Patent 3,277,158*

Vinyl acetate is produced from  $C_2H_4$  by an improved process carried out in the presence of 0.001–5 wt.% Pd, 0.05–5 wt.% halogen and 0.1–10 wt.% alkali metal acetate.

### Platinum Group Metal Catalysts in the Production of Unsaturated Esters

UNION OIL CO. OF CALIFORNIA

*U.S. Patent 3,277,159*

Unsaturated esters are prepared from hydrocarbon olefines by utilising catalytic amounts of Pt group metal.

### Platinum Group Metal Hydroforming Catalysts

SHELL OIL CO. *U.S. Patent 3,278,419*

A Pt metal reforming catalyst is reactivated by introducing  $Cl_2$  and water into the feed until about 0.3 wt.%  $Cl_2$  is introduced into the catalyst, removing at least part of the C deposits by burning and then maintaining the catalyst bed at 900–1,000°F for at least 8 h in the presence of an inert gas containing at least 20 vol.%  $O_2$ .

### Rhodium Hydrogenation Catalyst

SHELL OIL CO. *U.S. Patent 3,278,611*

Aromatic, halogenated halides are hydrogenated with  $H_2$ , in the liquid phase, at 10–90°C and in the presence of 0.0005–15 wt.% Rh.

### Platinum-on-Alumina Reforming Catalyst

AMERICAN CYANAMID CO. *U.S. Patent 3,280,041*

$\gamma-Al_2O_3$  catalyst supports are calcined, impregnated with  $H_2O$  and calcined again before receiving

the catalyst metal to obtain better activity and crushing strength.

### Palladium Catalyst in the Production of Sulphur Dioxide

ALLIED CHEMICAL CORP. *U.S. Patent 3,282,646*

$SO_2$  gas is produced by heating  $(NH_4)HSO_4$  at 400–500°C and in the presence of a Pd/C catalyst, whilst contacting it with a non-oxidising gas.

### Platinum Group Metal Halide Complex Catalyst

GEOFFREY WILKINSON *Canadian Patent 745,663*

An hydrogenation, hydroformylation or carbonylation process, in which an unsaturated organic compound is reacted with  $H_2$  and/or CO, employs a liquid medium containing a dissolved catalyst, which is an halogen- or pseudo-halogen-containing Pt group metal complex with empirical formula  $L_nM^vX_y$ , where L = ligand, n = number of ligand molecules, M = Pt group metal, v = valency state of M, X = halogen atom or pseudo-halogen group, y = number of X (at least 1). At least one ligand is present and is one or more of: (a) organic isocyanides, (b) organic compounds which include in their molecules an atom of a Group Vb or VIb element with a lone pair of electrons, (c) (when M is Rh or Ir and the process is hydroformylation) stannous and Ge(II) halides.

### Preparation of an Alumina-Platinum Catalyst

ALL-UNION SCIENTIFIC-RESEARCH INSTITUTE OF PETROCHEMICAL PROCESSES

*U.S.S.R. Patent 182,119*

The catalyst for dehydrocyclisation of paraffins is prepared by impregnating  $Al_2O_3$  with a Pt solution. To increase its capacity for repeated regeneration, 1–5% alkali metal is added to the  $Al_2O_3$  during or directly after the precipitation of the  $Al(OH)_3$  gel.

## FUEL CELLS

### Rechargeable Batteries

UNION CARBIDE CORP. *British Patent 1,047,831*

A rechargeable battery includes an auxiliary electrode which is in contact with the cathode and which comprises a porous conductive base on which a Pt, Rh, Pd or Ir  $H_2$ -ionisation catalyst has been deposited.

### Fuel Cells

'SHELL' RESEARCH LTD.

*British Patent 1,049,428*

A fuel cell unit comprises a porous metal substrate having applied to one of its surfaces in the following order: a porous layer of Ni aluminide; a layer of solid oxide electrolyte constituted by  $ZrO_2$  stabilised with lime or yttria; an  $O_2$ -permeable layer of Pt, Pd, Ir, Ru, Rh or Ag.

## Fuel Cells

E.I. DU PONT DE NEMOURS & CO.

*British Patent* 1,052,327

The cell electrodes are of non-porous, hollow permeable polymeric filaments coated with an electron carrier and a catalyst, e.g. Pt/Ag.

## Fuel Cell Electrode

ESSO RESEARCH & ENGINEERING CO.

*British Patent* 1,055,433

The electrode comprises an electroconductive base coated and/or impregnated with a binary catalytic mixture of 60-90 wt. % Pt, 10-40 wt. % Re.

## Noble Metal Fuel Cell Electrodes

ALLIS-CHALMERS MANUFACTURING CO.

*U.S. Patent* 3,266,939

A fuel cell comprises a housing, a unitary fuel-oxidant-electrolyte solution comprising 5-50 wt. % alcohol, 0.5-5 vol. %  $H_2O_2$  and the balance aqueous hydroxide electrolyte and electrodes at least partially immersed in this solution. Of these the fuel electrode carries a Pt, Pd, Ir, Rh, Os or Ru catalyst and the oxidant electrode carries Ag, Co, Ni or their oxides or Fe oxide as catalyst.

## Production of Fuel Cell Electrode

AIR PRODUCTS & CHEMICAL INC. and

NORTHERN NATURAL GAS CO.

*U.S. Patent* 3,276,976

A fuel cell electrode is produced by connecting an electroconductive base member as a cathode and a body of Pt as an anode in an electrolytic plating solution comprising Pt and Group IB or VIII promoter metal taken in 1:1 to 2:1 molar ratio and applying a pulsating current between the electrodes.

## Noble Metal-Carbon Fuel Cell Electrodes

AMERICAN CYANAMID CO.

*U.S. Patent* 3,281,282

Noble metals are deposited by first impregnating with a base metal salt, e.g.  $CdCl_2$  or  $CoCl_2$ , and then depositing the noble metal (Pt or Pd) by electrolytic displacement.

## Noble Metal Electrodes

THE ELECTRIC STORAGE BATTERY CO.

*U.S. Patent* 3,282,737

A porous electrode for a fuel cell is produced by depositing a first metallic catalyst on a metallic surface of a finely divided substrate, depositing a second catalyst coating and shaping the electrode. The metallic surface of the finely divided substrate is selected from Ni, Ag, Cu or Co and the metallic catalyst coatings are selected from Ag, Pd, Au, Pt, Ru, Rh, Os and Ir.

## Biochemical Fuel Cell

U.S. SECRETARY OF THE ARMY

*U.S. Patent* 3,284,239

Fuel cells using fuel substances generated bio-

chemically are equipped with a Pt screen anode and a Pt/C air cathode.

## CHEMICAL TECHNOLOGY

### Separation of Acrylonitrile from Mixtures

ESSO RESEARCH & ENGINEERING CO.

*British Patent* 1,051,245

The gas containing acrylonitrile is passed through a bed of a solid salt of a monovalent Group IB metal or of Pt, Pd, Ir, Rh, Ru or Os capable of forming a complex with acrylonitrile, the bed being purged and stripped when saturated.

## GLASS TECHNOLOGY

### Glass Fibre Production

PITTSBURGH PLATE GLASS CO.

*British Patent* 1,049,517

A bushing for the production of glass fibres includes a glass contacting portion made of an alloy of 10-50 wt. % Au and 50-90 wt. % Pt.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Ternary Alloy Strain Gauge

KABUSHIKI KAISHA HITACHI SEISAKUSHO

*British Patent* 1,047,412

A mechano-electrical strain gauge comprises at least one wire or foil made of a ternary alloy comprising 20-60 at. % Pt, 20-60 at. % Pd and 5-30 at. % Ir.

### Anhydrous Electrochemical Memory Device

SPERRY RAND CORP.

*British Patent* 1,051,342

The device has a cell with electrodes (e.g. made from Ag, Au or Pt metal), immersed in an electrolyte formed from Ag halides and  $Ag_2S$ .

### Electrical Resistance Element

CTS CORP.

*U.S. Patent* 3,271,193

An electrical resistance element is produced by admixing a composition of thermally decomposable organic metal compound containing at least one of the noble metals Ru, Rh, Ir and Pd and a thermally decomposable glass-forming organic metal compound in solution, applying a film of the mixture on to the surface of a high temperature resistant, non-conductive base, firing the film at 750-900°C to cause thermal decomposition and cooling the film consisting of glass and uniformly dispersed noble metal oxide.

### Ceramic Capacitor Production

PACKARD-BELL ELECTRONICS CORP.

*U.S. Patent* 3,284,683

A Ni alloy support is coated on one surface with Au, Pt or Pd and this is diffused in before a  $BaTiO_3$  layer is applied and fired.