

ELECTRICAL AND ELECTRONIC ENGINEERING

Beam Lead Technology

M. E. HUTTON, *Microelectronics*, 1970, (April), 32-35

Beam leads of Au for Si monolithic circuits are produced in four stages: passivation, metal deposition, circuit delineation, and chip separation. During the second stage a thin layer of Pt is sputter-deposited over the whole slice and sintered into the contact window areas to produce Pt silicide. Excess Pt is etched away without masking. Layers of Ti and Pt are then deposited in sequence over the whole slice. Ti keys the

metallising to the passivation surface. Pt acts as a diffusion barrier to subsequent Au deposition.

TEMPERATURE MEASUREMENT

Investigations on Very Thin Thermocouple Wires Made from Noble Metal Alloys

M. MAJDIC and R. TILMES, *Prakt. Metallog.*, 1970, 7, (2), 73-83

Measurements with 20 μm diam. wire 52% Au-46% Pd-2% Pt-5% Rh-95% Pt thermocouples were irreproducible because of deformation of the wire but a heat treatment was developed to standardise the structure.

NEW PATENTS

METALS AND ALLOYS

Silver Alloy for Electrical Contacts

TEXAS INSTRUMENTS INC.

British Patent 1,191,675

An improved alloy for contacts consists of 1-20% CdO, 0.001-0.5% Ru or Hg and the balance Ag. The Ru is superior to Co in increasing the erosion resistance of Ag Cd oxide alloys.

Sheathed Metal

JOHNSON MATTHEY & CO. LTD

British Patent 1,195,349

A core of W or Mo or a W-Mo alloy is sheathed with a Pt group metal, or an alloy based on at least one Pt group metal. A barrier layer is disposed between core and sheath, and pO_2 in the interfacial space is reduced to $< 1 \mu$.

Palladium-Iridium Alloy for Glass Fibre Production

OWENS-CORNING FIBREGLASS CORP.

U.S. Patent 3,488,172

A bushing fabricated from an alloy containing 95-99.7% Pd and 5-0.3% Ir by weight made by melting and casting under a vacuum of about 1 mm of Hg can be used for glass fibre production.

Platinum-Rhodium-Gold Alloy

JOHNSON MATTHEY & CO. LTD

German Appl. 1,533,284

Pt-Rh-Au alloys, suitable for use in contact with molten glass, consist of: 60-97 wt.% Pt, 2-25 wt.% Rh and 1-10 wt.% Au.

Alloy

JOHNSON MATTHEY & CO. LTD

German Appl. 1,533,290

An alloy suitable for use in the fabrication of

spinnerettes consists of: 50-80 wt.% Au, 0.04-0.5 wt.% Ir and the remainder Pt. Preferred quantities are 70, 0.2 and 29.8 wt.% respectively.

Dispersion Hardened Metals and Alloys

JOHNSON MATTHEY & CO. LTD

Dutch Appl. 69.10,671

The metal or alloy to be hardened is flame sprayed with a reactive component which is then converted to a dispersed phase component. The examples show the use of the process in hardening precious metals and alloys.

CHEMICAL COMPOUNDS

Ruthenium Tetracarbonyl Trimer

RHONE-POULENC S.A.

British Patent 1,189,255

$[\text{Ru}(\text{CO})_4]_3$ is prepared by heating CO with a tris (β -dionato)Ru at 100° to 250°C and atmospheric pressure in an alcohol boiling between 100° and 250°C.

Osmium Carbonyl

JOHNSON MATTHEY & CO. LTD

U.S. Patent 3,508,870

A method of preparing Os carbonyls wherein a solution of OsO_4 in an inert hydrocarbon solvent is heated at an elevated temperature at super-atmospheric pressure in the presence of CO. The product is primarily $\text{Os}_3(\text{CO})_{12}$ with traces of $\text{Os}_4\text{O}_4(\text{CO})_{12}$.

ELECTROCHEMISTRY

Electrochemical Cells

LEESONA CORP.

British Patent 1,199,017

A light-weight electrode consists of an expanded layer of a catalytic metal such as Au, Pd, Pt, Ir, Rh, Ru or Os.

ELECTRODEPOSITION AND SURFACE COATINGS

Chemical Platinum Plating Process

INTERNATIONAL NICKEL CO. INC.

U.S. Patent 3,486,928

A method of depositing Pt alloys containing up to about 20% Rh, up to about 10% Ir and up to about 10% Ru on an active surface is described. The bath used contains an alkaline Pt(IV) hydroxide solution with about 2–20 g/l Pt, an alkali metal hydroxide to give a minimum bath pH of about 8, up to about 1 mole/l of a stabiliser such as ethylamine, and up to about 1 g/l N_2H_4 . Pt deposits produced in the absence of the stabiliser have catalytic properties whereas Pt and Pt alloy deposits produced in the presence of the stabiliser are bright.

Stabilising Noble Metal Coatings

JOHNSON MATTHEY & CO. LTD

German Appl. 1,916,791

Coatings of a Pt metal or alloy on another metal, particularly Mo or W, are stabilised by reducing the interfacial pressure and replacing the O_2 by an inert gas.

LABORATORY APPARATUS AND TECHNIQUE

Sheathed Metals

JOHNSON MATTHEY & CO. LTD

British Patent 1,190,266

A refractory metal or alloy article (not Mo or W) is sheathed in a Pt group metal or alloy, optionally with an intermediate barrier layer of, for example, a rare earth metal carbide. Applications are stated to be stirrers, crucibles, dies, etc. in contact with molten glass.

HETEROGENEOUS CATALYSTS

Hydrogenation Catalyst

E. J. HOFFMAN

British Patent 1,189,096

A catalyst such as a Group VIII metal or compound (Ru, Rh, Os, Ir, Pt etc.) is used in the production of liquid hydrocarbon fuel from coal.

Palladium-Lead Catalyst

CHAS. PFIZER & CO. INC.

British Patent 1,189,693

A catalyst for selective hydrogenation of acetylenic to olefinic bonds is obtained by impregnating a support with a Pd salt and a Pt salt, and reducing the Pd salt to the metal.

Production of Alkyl Aromatic Compounds

UNIVERSAL OIL PRODUCTS CO.

British Patent 1,193,486

A hydrocarbon feedstock for the alkylation of

aromatic compounds is obtained by the dehydrogenation of mixed straight chain paraffins. The catalyst used is a composite of Pt, Pd or their compounds on an Al_2O_3 associated with an alkali metal or its oxide. A typical catalyst contains 0.75 wt.% Pt, 0.50 wt.% Li and 0.50 wt.% As on an Al_2O_3 support.

Catalytic Coatings

E. I. DU PONT DE NEMOURS & CO.

British Patent 1,197,067

Walls of cooking devices exposed to organic products are coated with a mixture of an enamelling frit and a catalyst which may be one or more of Pt, Pd, Ru, Ag, Rh, Os or Ir. See also British Patents 1,197,068 and 1,197,069.

Naphtha Reforming Catalyst

CHEVRON RESEARCH CO.

U.S. Patent 3,487,009

Reforming a naphtha in the presence of H_2 at low pressures to produce at least 98 F–I clear octane gasoline is accomplished using a catalyst composed of a porous inorganic oxide carrier containing 0.01–0.5% Pt, 0.01–0.5% Re and 0.001–0.1% Ir. See also 3,487,010.

Production of Hydrogen Peroxide by the Anthraquinone Process

DEUTSCHE GOLD UND SILBER-SCHNEIDANSTALT

U.S. Patent 3,488,150

A process for the production of H_2O_2 by the anthraquinone process is described. A mixed catalyst of Pd with another metal of the Pt group (0.1 to 50%), especially Ir (preferably 5–30%), is used as hydrogenation catalyst in the hydrogenation step giving improved selectivity and activity.

Hydrogen Production

UNION OIL CO. OF CALIFORNIA

U.S. Patent 3,490,872

H_2 is produced from CO and water by contacting them at 50–650°C and 1–5000 atm, with an aqueous liquid phase containing from 0.001–10% of a Group VIII noble metal, oxide or salt and having a pH from 7.1–14. Contacting is carried out on one side of a metallic membrane permeable to H_2 and the resulting H_2 is passed through the membrane by maintaining a lower pressure on the other side of the membrane. The Group VIII noble metal catalyst is Rh, Ir or Pt. The H_2 -permeable membrane comprises Pd or Pd-Ag alloy which also contains up to 75% of Ir, Pt or Rh.

Composite Hydrocarbon Conversion Catalyst

UNIVERSAL OIL PRODUCTS CO.

French Appl. 2,007,507

The catalyst consists of a Pt group metal and Re (as metal, oxide, sulphide or halide) deposited on Al_2O_3 and a crystalline aluminosilicate mixture.

HOMOGENEOUS CATALYSIS

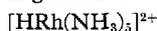
Palladium Pi-Allyl Complexes

W. R. GRACE AND CO. *British Patent 1,193,560*
Complexes which may be used in the polymerisation of butadiene are complexes of Pd salts with allylic ligands. They are produced by the reaction of a nitrile complex $\text{PdX}_2(\text{RCN})_2$ with a monoolefine boiling at 125–300°C. (X is Cl, Br, I, acetate or formate; R is a 1–4 C alkyl group). Suitable olefines are vinyl naphthalene and methyl styrene.

Ammino Rhodium Compounds

JOHNSON MATTHEY & CO. LTD
British Patent 1,196,583

A method is provided for synthesis of compounds of ammino ions of general formula

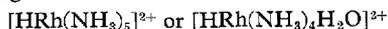


in which the H is coordinated to Rh. The compounds are useful homogeneous hydrogenation catalysts.

Catalysts

JOHNSON MATTHEY & CO. LTD
British Patent 1,197,723

Water-soluble unsaturated organic compounds, especially carboxylic acids, are catalytically hydrogenated in the presence of a Rh compound having a cation of formula:



Oxidation Catalyst

FARBWERKE HOECHST A.G. *British Patent 1,197,843*
Vinyl acetate is obtained by the reaction of C_2H_4 , CH_3COOH and O_2 in the presence of Pd acetate and a pyridine base.

Hydrogenation of Unsaturated Aliphatic Compounds

LEVER BROS CO. *U.S. Patent 3,489,778*
Unsaturated aliphatic compounds, especially soya oil, are catalytically hydrogenated by contacting them with H_2 in the presence of a solution of a Pt compound, e.g. H_2PtCl_6 and a stannous halide, e.g. SnCl_2 . A lower dialkyl ether, dialkyl ketone or aliphatic carboxylic acid or its ester may be used as solvent.

Hydroformylation Catalyst

JOHNSON MATTHEY & CO. LTD
Dutch Appl. 69.11.827

Unsaturated olefinic compounds are hydroformylated in the presence of a phosphine complex of a Rh hydride, e.g. $\text{RhH}(\text{CO})(\text{PR}_3)_3$.

FUEL CELLS

Fuel Cell

GENERAL ELECTRIC CO. *British Patent 1,193,660*
In a cell for oxidising a 1–3 C alcohol, anodes of

Pt and Ru alloys are claimed to be the most efficient.

Air or Oxygen Cells

LEESONA CORP. *British Patent 1,195,915*
In such cells, the consumable anode may consist of Cu or Ag, and the catalyst of the cathode a finely divided Group VIII metal, e.g. Rh, Pd, Ru, Os, Ir. The Group VIII metal may be alloyed with Au or Ag.

CHEMICAL TECHNOLOGY

Hydrogen Purification

UNION CARBIDE CORP.
British Patent 1,195,852

In a plant for the continuous production of H_2 , after the removal of various deleterious ingredients from the product gas stream, the H_2 is finally purified by diffusion through Pd or a Pd alloy.

ELECTRICAL AND ELECTRONIC ENGINEERING

Film-type Conductors

PLESSEY CO. LTD
British Patent 1,190,195

The conduction in an electrical resistance heater is provided by a layer of oxide, or oxides, of Ru, Rh, Pd, Os and/or Ir.

Contacts for Semiconductors

TEXAS INSTRUMENTS INC.
British Patent 1,193,868

A multilayered contact consists of the films: (a) vacuum-deposited Pt, (b) sputtered Mo, and (c) a sputtered mixture of 95% Au and 5% Pt.

Sintered Composite Body

JOHNSON MATTHEY & CO. LTD
British Patent 1,198,616

A sintered composite body for an electric contact is made by using a first part in the form of a rod (e.g. of Cu) to exert pressure on and supply current to a second part consisting of a mass of powdered metal or alloy (Ag, Pt, Ag–CdO, etc.) under conditions producing sintering of the mass and bonding of the two components.

Electric Contacts

JOHNSON MATTHEY & CO. LTD
German Appl. 1,489,999

A multiple electrical contact assembly consists of a metal backing strip, to which individual contact elements are secured in pre-determined positions so that individual contact assemblies (consisting of one or more contacts and a carrying arm) may be stamped from the strip. The contact elements may be made of a noble metal such as Ag, Au, Pt or Pd or an alloy thereof, and the backing strip of a base metal. Locating holes are provided to facilitate location in a press tool.