

# NEW PATENTS

## METALS AND ALLOYS

### Blanks for Coins and Medals

DEGUSSA A.G. *European Appl.* 139,902  
Pt, Pd, Au, Ag and alloy blanks have better flow properties during shaping, such as striking, when the blanks have a porosity of 8–35 vol%, preferably 10–25 vol%. This may be achieved by creating the blanks from metal powders.

### Single Crystal Alloys

ROLLS-ROYCE LTD. *U.S. Patent* 4,488,915  
Single crystal castings are made from specified Ni alloys containing 1–4% Mo and/or Ru.

### Hydrogen Storage Material

U.S. SECRETARY OF THE NAVY *U.S. Patent* 4,489,049  
A H<sub>2</sub> storage material consists of a substrate such as Mylar film coated with an amorphous binary alloy of (a) Fe, Co or Ni and (b) a lanthanide metal and then with a film of Pd.

### Diffusion Membrane

KERNFORSCHUNGSANLAGE JULICH G.m.b.H. *U.S. Patent* 4,496,373

A diffusion membrane for separating H<sub>2</sub> from gas mixtures consists of (a) a foil of Ta, Nb, Ti, V and/or Ni saturated with Cu, Ag or Y as in (b), and coated on the gas-access side with (b) an alloy of Pd with at least 45 at.% Cu or 50 at.% Ag or 7 at.% Y.

### Brazing Alloys

G.T.E. PRODUCTS CORP. *U.S. Patent* 4,497,772  
Improved ductile brazing foils are made from Cu-Ni with 0.05–5% Ti, V and/or Zr and 5–30% Pd.

## ELECTROCHEMISTRY

### Amorphous Alloys for Electrodes

DAIKI ENGINEERING CO. LTD. AND K. HASHIMOTO *British Appl.* 2,146,660A

A surface activated amorphous alloy for use as an electrode in electrolysis consists of: 10–30 at.% of P and/or Si of which up to 7 at.% may be substituted with B and/or C, and 90–70 at.% of a metallic component comprising at least 20 at.% Pd and 20–50 at.% Ru, Rh, Ir and/or Pt. The electrodes may be surface activated by diffusing Zn into the surface and then leaching the Zn from the surface.

### Reference Electrodes

U.K. ATOMIC ENERGY AUTHORITY *British Appl.* 2,148,511A

A Pt wire is used in a reference electrode suitable for measuring electrochemical potential in a pressurised and/or heated system. Short-comings of known Ag/AgCl and Pd alloy thimble H reference electrodes are discussed.

### Light-Assisted Electrolysis

TEXAS A. & M. UNIVERSITY *U.S. Patent* 4,501,804  
In an apparatus for water electrolysis with the assistance of solar radiation, the photocathode is a p-type Si body coated on at least one side with a catalyst chosen from Pt, Ni, Ag, Au, CoMoO<sub>4</sub> and NiMoO<sub>4</sub>, and the photoanode is an n-Si body coated on at least one side with a film of SiO<sub>2</sub> doped with Pt, Pd, Rh, Ru, Te, Co, Ni or Au.

### Electrode for Electrolysis

IMI KYNOCH LTD. *U.S. Patent* 4,502,936  
An anode of improved durability, especially in the low temperature electrolysis of brines consists of a Ti substrate coated with a sub-stoichiometric oxide of a metal such as Ti or Ta and then with platinum group metal(s) or oxide(s).

### Oxygen Ionisation

B. WERTZ *German Offen.* 3,401,378  
The offensive odour produced by ionisation of gaseous O<sub>2</sub> is reduced when at least one of the electrodes is made from or coated with Pt or Au.

## ELECTRODEPOSITION AND SURFACE COATINGS

### Catalyst System, Especially for Electroless Metal Deposition

ROHM & HAAS CO. *European Appl.* 141,528  
A reaction on a surface is catalysed by applying to the surface a monolayer of a positively charged polymer whose particles are less than 3 $\mu$ m in size. The polymer contains, in finely dispersed form, an active agent able to participate in or catalyse the reaction on the surface. The active agent may be a platinum group metal, Au or Ag, among others.

### Transfer Metallisation of Dielectrics

INTERNATIONAL BUSINESS MACHINES CORP. *European Appl.* 144,046

An appropriate layer of a metal such as Pt, Pd, Rh or Ni is applied in a pattern to a polyvinyl butyral resin layer on a polyester film support. The butyral layer is placed next to an unsintered dielectric substrate provided with a pattern of Mo or W. The polyester film is stripped off and the metal sintered on to the substrate, destroying the butyral resin.

### Solderable Palladium-Nickel Coatings

E. I. DU PONT DE NEMOURS & CO. *European Appl.* 146,152

A permanently solderable electroplated coating is formed on conductive surfaces by depositing a first layer of 46–82 at.% Pd and 18–54 at.% Ni. This is covered by a continuous second layer of 96–100 at.% Pd and 0–4 at.% Ni having a thickness of up to 2 nm. Metal ammine salts are used in the electrolyte.

### **Palladium Electroplating**

OMI INTERNATIONAL CORP. *U.S. Patent 4,487,665*

A bath for the electrodeposition of white Pd preferably contains, per litre, 0.1–20g Pd as Pd(NH<sub>3</sub>)<sub>2</sub>-Cl<sub>2</sub>, 25–120g ammonium sulphate, 0.5–5g benzaldehyde-o-sodium sulphate, 0.1–1g Ni sulphate or Ni ammonium sulphate and 2.5–15g Cl ions as KCl.

### **Palladium Electroplating Bath**

W. C. HERAEUS G.m.b.H. *U.S. Patent 4,491,507*

Bright Pd coatings free from pores and fissures and having a low internal stress are produced by electrodeposition from a bath containing, per litre, 5–10g Pd as Pd(NH<sub>3</sub>)<sub>4</sub>Br<sub>2</sub>, 10–150g NH<sub>4</sub>Br, 10–150g sulphamic acid and/or ammonium sulphamate and 1–20g nicotinic acid and/or 0.1mg–0.5g niacinamide and operating at pH 6.5–10.

### **Electroless Plating**

BAYER A.G. *German Offen. 3,326,508*

Non-conductive substrates are activated for partial electroless metal plating by selectively spraying the area to be coated with an organic complex of Pt, Au, Ag or Cu but preferably Pd.

## **LABORATORY APPARATUS AND TECHNIQUE**

### **Electrochemical Gas Sensor**

ALLIED CORP. *European Appl. 138,161*

A sensor particularly intended for detecting H<sub>2</sub>S has an electrochemical cell with a Pt reference electrode, a Pt or Au sensing electrode and a C counter electrode.

### **Silane Gas Sensor**

NOHMI BOSAI KOGYO CO. LTD. *European Appl. 139,139*

A silane-sensitive element in a sensor for detecting low concentrations of silane gas in air consists of an electrode-equipped alumina porcelain tube coated with a mixture of Pt, SbOCl and SnO<sub>2</sub>, which is then calcined and exposed to a silane atmosphere to stabilise its properties.

### **Engine Intake Air Flow Measurement**

NIPPONDENSO CO. LTD. *European Appl. 144,027*

A Pt wire resistor is placed in the path of the intake air of an engine to sense the change in temperature caused by the air flow and thus measure the flow rate.

### **Milk Coagulation Detection**

SNOW BRAND MILK PRODUCTS CO. LTD. *European Appl. 144,443*

The state of coagulation of milk is detected by inserting a fine metallic wire preferably of Pt into the milk and passing a current continuously or intermittently. The change in temperature of the wire is a measure of the coagulation.

### **Oxygen-Pumping Device**

FORD MOTOR CO. *U.S. Patent 4,487,680*

An O sensor for use in the exhaust system of I.C. engines consists essentially of a ZrO<sub>2</sub> solid electrolyte stabilised with Y or Ce oxide and provided with catalytic electrodes of Pt, Rh or Pd.

### **Chlorine Detector**

UOP INC. *U.S. Patent 4,492,614*

A solid-electrolyte concentration cell for detecting Cl<sub>2</sub> in gas samples incorporates Au wire leads and a catalyst for the ionisation of Cl<sub>2</sub> which is Pt, Pd or one of their alloys.

### **Gas Sensor**

GC INDUSTRIES *U.S. Patent 4,498,970*

In a specified electrochemical gas sensor the sensing element which consists of Pt powder compressed on to a film of Teflon is attached to a Pt connecting wire by means of a Au-filled epoxy resin adhesive.

## **HETEROGENEOUS CATALYSIS**

### **Dissolved Oxygen Removal**

WESTINGHOUSE ELECTRIC CORP. *European Appl. 140,587*

An aqueous medium containing dissolved O is mixed with hydrazine and contacted with a bed of Pd or Pt metal catalyst deposited on a solid carrier. The reaction with hydrazine reduces the O to below 10 ppb.

### **Hydrocarbon Processing Catalyst**

MOBILE OIL CORP. *European Appl. 140,608*

Heavy oils are simultaneously hydrocracked and dewaxed in the presence of a zeolite beta-zeolite X or Y mixture, optionally lanthanide-exchanged, supporting Pt, Pd, Ir, Rh or another catalyst.

### **Hydrogen Isotope Exchange Catalyst**

ATOMIC ENERGY OF CANADA LTD. *European Appl. 141,596*

A catalyst structure consists of Pt or another Group VIII metal deposited in crystallite form on a hydrophobic, high surface area, crystalline SiO<sub>2</sub> lattice and the whole provided with an outer, porous membrane coating of organic polymer, such as PTFE. The preferred support is silicalite.

### **Partial Catalytic Combustion in a Gas Turbine**

TOSHIBA K.K. *European Appl. 144,094*

A reduced NO<sub>x</sub> content in a fuel gas combustion product is achieved by partial catalytic combustion. Fuel and air are mixed and passed over a packed catalyst such as Pd at a temperature below the ignition temperature of the mixture. The product is mixed with fresh fuel and burnt in the absence of a catalyst. The catalyst may be an Al<sub>2</sub>O<sub>3</sub> honeycomb impregnated with a La salt solution and then with a Pd salt solution.

### Synthesis Gas Production Catalyst

SUD-CHEMIE A.G. *European Appl.* 144,506

A catalyst for the production of synthesis gas or H<sub>2</sub> from aqueous methanol is equally good for cracking or steam reforming and consists of a platinum group metal or metals supported on either (a) TiO<sub>2</sub> or CeO<sub>2</sub> mixed with other refractory oxides and/or hydraulic binders or (b) Ti oxide applied to an Al<sub>2</sub>O<sub>3</sub> or other support. Pt, Pd and Rh are the preferred catalysts.

### Exhaust Gas Treatment Catalyst

STE. FRANCAISE DES PRODUITS POUR CATALYSE PRO-CATALYSE *European Appl.* 145,584

The catalysts are particularly intended for I.C. engine exhaust gases and have a conventional composition but the major part of the active platinum metal-transition metal mixture is introduced into the inert material forming the catalyst carrier and only the residual active metal is added at the final impregnation stage. In an example Al<sub>2</sub>O<sub>3</sub> is mixed with Pd, Ce and Fe salts, fired to give spheres and the spheres are then impregnated with Fe and Ce salt solutions.

### Removing Carbon Particles from Exhaust Gases

TOKYO ROKI CO. LTD. *European Appl.* 146,287

Black fumes from a diesel engine are trapped in a filter and the C particles are removed by oxidation in the presence of an injected catalyst, preferably a Pd, Pt, Cu or Ni compound.

### Palladium-Rhenium Hydrogenation Catalyst

E. I. DU PONT DE NEMOURS & CO. *European Appl.* 147,219

A new catalyst consists of 0.5–10% Pd and 1–10% Re on a C support where the active metals are present in the form of very small crystallites. It can be used in the hydrogenation of maleic acid to tetrahydrofuran and butyrolactone.

### Noble Metal Catalyst Production

VEG-GASINSTITUUT N.V. *European Appl.* 147,839

A catalyst containing metallic Pt, Pd, Au, Ag or Cu in finely divided form as "basis metal" and at least one Group VIII active metal on a refractory support is produced by contacting the catalyst containing the basis metal with one or more carbonyls of different Group VIII metals at above 100°C to produce an alloyed metal on the catalyst support. The catalysts can be used for methanation and the Fischer-Tropsch reaction.

### Fuel Activation in I.C. Engines

OPTIMIZER LTD. *European Appl.* 149,688

The consumption of fuel in an engine is reduced by "activating" it, before it reaches the engine, in a heated chamber filled with pellets coated with a noble metal catalyst, preferably in two different concentrations. Typically Al<sub>2</sub>O<sub>3</sub> pellets supporting Pt at a concentration ranging from 0.1–1% are used.

### Hydroformylation Catalysts

MOBIL OIL CO. *U.S. Patent* 4,487,972

Aldehydes and alcohols are formed by the reaction of olefins with synthesis gas in the presence of a polymer-bonded complex of Ru, Co but preferably Rh.

### Fuel Production Catalyst

GULF RESEARCH & DEVELOPMENT CO. *U.S. Patent* 4,493,905

A catalyst for the conversion of synthesis gas to diesel fuel consists of finely divided Al<sub>2</sub>O<sub>3</sub> impregnated with Ru, Co and Th or La and is prepared by a specified procedure.

### Synthesis Catalyst

STANDARD OIL CO. *U.S. Patent* 4,496,666

A catalyst for the production of CH<sub>4</sub> and methanol from synthesis gas consists of an Al<sub>2</sub>O<sub>3</sub> and/or SiO<sub>2</sub> carrier supporting a mixed oxide of general formula M<sub>a</sub>M'<sub>b</sub>RuO<sub>x</sub>, where M is Na, K or Rb, M' is Pt and/or Pd, a is 0.002–2 and b is 0.1–10.

### I.C. Engine

FORD MOTOR CO. *U.S. Patent* 4,499,863

In a process for running an I.C. engine on methanol fuel, at least part of the methanol is decomposed to CO and H<sub>2</sub> over a catalyst which is Pd, Pd-Pt or Pd-Rh.

### W-Containing Three-Way Catalyst

JOHNSON MATTHEY P.L.C. *U.S. Patent* 4,500,650

A catalyst for the purification of exhaust gases from I.C. engines consists of (a) a monolithic flow-through carrier, (b) a refractory oxide coating such as a wash-coat of Al<sub>2</sub>O<sub>3</sub> and Ce oxide, (c) Pt, Pd and/or Rh and (d) W or W oxide. This catalyst gives improved oxidation of hydrocarbons and reduced NH<sub>3</sub> formation.

### Hydrogenation of SBR Copolymers

JOHNSON MATTHEY P.L.C. *U.S. Patent* 4,501,685

A catalyst for the selective hydrogenation of aliphatic unsaturation in copolymers also containing aromatic groups consists of a non-porous C black carrier supporting 0.1–5% Pd and treated with a poison such as an amine, mercaptan or P oxyacid.

### Chlorine Production Catalysts

ELTECH SYSTEMS CORP. *U.S. Patent* 4,501,824

Catalysts for the production of ClO<sub>2</sub> from Na chlorate and H<sub>2</sub>SO<sub>4</sub> acid consist of (a) a valve metal oxide, such as TiO<sub>2</sub>, and (b) mixed oxides of platinum group metals, preferably Ru oxide with Rh oxide and/or Pd oxide or Rh oxide and Pd oxide or Ir oxide and Rh oxide or Pt oxide.

### Rhodium Complex Catalysts

STANDARD OIL CO. *U.S. Patent* 4,504,684

Catalysts for the hydroformylation of olefins to aldehydes consist of a SiO<sub>2</sub> carrier and a polymeric Rh complex such as [RhCl(CO)Ph<sub>2</sub>PC<sub>6</sub>H<sub>4</sub>PPh<sub>2</sub>]<sub>n</sub>

## Treatment of Effluent Gases from Nitric Acid Production

HOECHST A.G.

*German Offen.* 3,326,639

The NO<sub>2</sub> content of off-gases from HNO<sub>3</sub> acid plants is reduced by reacting the gases with ethylene at comparatively low temperature (30–230°C) in the presence of a Pt/Al<sub>2</sub>O<sub>3</sub> catalyst.

## HOMOGENEOUS CATALYSIS

### Silicone Release Compositions

GENERAL ELECTRIC CO.

*British Appl.* 2,151,243A

Complexes of Ru, Rh, Pd, Os, Ir and Pt are used as hydrosilation catalysts during the production of organopolysiloxanes having acrylic functionality for use in u.v. radiation-curable release coatings.

### Hydrogen Production from Water

COMMONWEALTH SCIENTIFIC & INDUSTRIAL RESEARCH ORGANISATION

*European Appl.* 138,627

H<sub>2</sub> is produced in the solar radiation of water by the interaction of an electron transfer agent with hydronium ions and a Pt catalyst in the presence of a sensitizer, such as the tris (2,2'-dipyridine) Ru (II) dication, which captures solar radiation.

### Methyl Formate Production

BP CHEMICALS LTD.

*European Appl.* 149,564

Methanol is reacted with a H acceptor in the presence of a platinum group metal catalyst to yield methyl formate. The acceptor may be an aldehyde, ketone or olefin. The catalyst may be an inorganic, organic or organometallic derivative of the metal which is preferably Ru. In the examples the catalyst is a Ru chloride-phosphine adduct or pentamethylcyclopentadienyl ruthenium chloride.

### Rhodium Acetate in a Catalyst System

DAVY MCKEE (LONDON) LTD.

*U.S. Patent* 4,496,769

An olefin-hydroformylation catalyst consists of [Rh(OAc)<sub>2</sub>H<sub>2</sub>O]<sub>2</sub> and a tertiary phosphine such as PPh<sub>3</sub>, which is continually replenished.

### Catalyst System

EXXON RESEARCH & ENGINEERING CO.

*U.S. Patents* 4,496,778/79

The formation of diols from olefins, O<sub>2</sub> and water is catalysed by a system consisting of OsO<sub>4</sub>, CuBr<sub>2</sub> and an aromatic or cycloaliphatic amine such as pyridine or 1,4-diazabicyclooctane.

## FUEL CELLS

### Fuel Cell

ELECTROCHEMISCHE ENERGIECONVERSIE N.V.

*European Appl.* 149,479

Unlike known fuel cells, this new cell is deliberately designed to have an internal leakage current. Its cathodes and anodes contain platinised C particles.

## Fuel Cell Catalyst

INTERNATIONAL BUSINESS MACHINES CORP.

*U.S. Patent* 4,490,219

A catalyst for use in a fuel cell consists of a substrate, such as C, coated with a "two-dimensional" thin film formed of flat, isolated crystallites of Pt, Pd or Ag.

## Gas-Diffusion Electrode

ELTECH SYSTEMS CORP.

*U.S. Patent* 4,501,803

A porous gas-diffusion electrode suitable for use in fuel cells, for example, and having Ru as its predominant electrocatalyst, is conditioned for operation as a H-consuming anode by connecting it as cathode in a suitable electrolyte until it drops below the reversible H potential and evolves H<sub>2</sub>.

## CORROSION PROTECTION

### Corrosion and Fouling Prevention

MITSUBISHI JUKOGYO K.K.

*European Appl.* 145,802

In a process for preventing fouling and corrosion of an underwater structure, a DC voltage is applied to a Pt-plated Ti electrode or an anode such as a Pb-Ag alloy to make the structure anti-corrosive.

### Cathodic Protection Anode

ORONZIO DE NORA S.A.

*European Appl.* 147,505

Ti, Nb or Ta plated with Pt may form the basis of a new form of flexible ground anode.

### Cathodic Protection Anodes

RAYCHEM CORP.

*European Appl.* 147,977

A Pt or Pt-coated wire is used to form anodes for the protection of reinforcing rods in concrete.

## CHEMICAL TECHNOLOGY

### Lubricant Additives

PENNWALT CORP.

*U.S. Patent* 4,497,719

Additives for maintaining the antiwear properties of lubricants at extremely high pressures are complexes of 3,5-dimercapto-1,2,4-thiadiazoles with Pt, Pd, Cu, Zn, Sn, Mo, Co, Ni, Ag or Au.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Gas Sensor Construction

NGK SPARK PLUG CO. LTD.

*European Appl.* 140,340

The bonding of metal films to the surface of a ceramic substrate in a gas sensor is enhanced by forcing particles of ceramic into the substrate surface before the metal is applied. The adherence achieved is better than with an electrolytically roughened surface. The ceramic may be zirconia and the film may consist of Pt, Au, etc., applied in a comb or spiral electrode pattern. The sensor is especially an I.C. engine exhaust gas sensor.

### Radio Wave Shielding Material

BRIDGESTONE CORP. *European Appl.* 140,664

A shielding material consists of a foamed plastic body having a three-dimensional skeleton chemically plated with Pt, Au, Ag, etc.

### Gyroscope of Reduced Sensitivity

BRITISH AEROSPACE P.L.C. *European Appl.* 142,937

Pt-Co or Sm-Co permanent magnet torquers may be used in gyroscopes having a means for correcting its temperature sensitivity.

### Optical Fibre Cable

TELEPHONE CABLES LTD. *European Appl.* 142,961

Transfer losses on ageing occur in optical fibres by the gradual absorption of H<sub>2</sub>. This is now avoided by introducing into the cable a H trapping material selected from Pd, Zr, Ti and/or MnO<sub>2</sub>.

### Programmable Thick Film Networks

CENTRALAB INC. *European Appl.* 143,493

Attenuators, voltage dividers and the like are made from a substrate screen printed with a dielectric glaze and a thick film conductor in the form of a fusible link straddling the glaze and coated with a further layer of glaze. If high energy is released to the fusible link the second glass layer will rupture releasing the conductive material and resulting in a high post fusing resistance. The preferred fuse element consists of Pd-Au optionally combined with Pd-Ag.

### Ferromagnetic Material for a Magnetic Head

HITACHI LTD. *European Appl.* 144,150

A marked increase in recording density is achieved with a head made from an alloy containing Fe, 2-12% Si and 5-25% of at least one of Pt, Pd, Ir, Rh, Ru, Au and Ag, such as an alloy of Fe with 6.5% Si and 10% Ru.

### Getter Pumps for High Vacuum Pumps

SIEMENS A.G. *European Appls.* 144,522/23/24

Pt, Pd, Ce and their alloys are among the metals which may form the getters in a new design of getter pump.

### Fusible Link in an Integrated Circuit

MONOLITHIC MEMORIES INC. *European Appl.* 146,688

Consistency in operation and lower fusing temperatures are obtained in circuits having a fusible link structure made from a Pt-Si alloy, preferably containing 23±2.3% Si.

### Solar Insulating Window Film

OPTICAL COATING LABORATORY INC. *European Appl.* 149,105

A multilayer film composite has a plastic base coated with Pd, Ni and/or their oxides, Pd, Cu and Ni, Cr and/or their oxides and/or sulphides.

### Sparking Plug

NIPPONDENSO CO. LTD. *U.S. Patent* 4,488,081

Crack formation on the centre electrode of a sparking plug is reduced by joining a Pt-Ir alloy containing 15-30% Ir to the spark-discharge portion of the centre electrode and a Pt-Ni alloy containing 15-30% Ni to the spark-discharge portion of the ground electrode.

### Electric Contacts

G. RAU G.M.B.H. & CO. *German Offen.* 3,335,274

In a specified procedure for making electric contacts, shaped mixtures of metal powders or filaments are heat treated to form homogeneous alloys. Mixtures of Pd and Ag are preferred.

### Electric Switch Contacts

SIEMENS A.G. *German Offen.* 3,335,597

An electric switch for use at low current densities consists of Mo leads, one terminal of which is coated with a Pt alloy containing 1-10% W, and the other with a Ag alloy containing 1-10% Cu.

## MEDICAL USES

### Surgical Clip

W. M. KIRSCH, YONG HUA ZHU, R. B. CUSHMAN  
*British Appl.* 2,150,440A

A surgical microclip, particularly adapted for microvascular anastomoses, is preferably made of a noble metal such as Pt, Au or Ag.

### Temperature Monitoring Catheter

AMERICAN HOSPITAL SUPPLY *European Appl.* 144,125

A helically wound, bifilar electric wire coil is embedded in the thermistor of a catheter used to monitor body temperature. The wire may be made of Pt, Au, Ag or Cu.

### Treatment of Meningitis

WELLCOME FOUNDATION LTD. *European Appl.* 145,359

Cerebrospinal meningitis may be treated with a Ru of Al complex of a bacterial capsular polysaccharide containing sialic acid.

### Implantable Electrode

SIEMENS A.G. *European Appl.* 147,710

The medical electrode is produced by sputtering Pt or Pt-Ir on a glass carbon target.

### Oral Anticancer Compositions

JOHNSON MATTHEY P.L.C. *European Appl.* 147,926

New agents for oral administration have the structure ABPtXYZ<sub>2</sub>, where A and B are ammine or the same or different alkylamine, X and Y are the same or different and represent halide, pseudohalide or, together, cycloalkane dicarboxylate (with certain exclusions) and Z is halide or hydroxy (if present). A typical compound is cis-[PtCl<sub>2</sub>(NH<sub>3</sub>)(PrNH<sub>2</sub>)].