NEW PATENTS

METALS AND ALLOYS

Amorphous Magnetic Alloy

READ RITE CORP. *European Appl.* 803,882A

An amorphous magnetic metal alloy comprising $T_aT_bT_c$, where T_a includes 75–98 at.% of Fe and/or Co; T_b includes 2–20 at.% of Rh; and T_c includes 2–15 at.% of Zr, has a saturation magnetic induction B_s of ≥ 1200 Gauss and a saturation magnetostriction constant $\lambda_s < 10 \times 10^{-6}$. Also claimed is a similar alloy which contains 2–15 at.% Rh and additionally 3–20 at.% of Pt and/or Pd. The alloys have a high corrosion resistance and are used in magnetic transducers or heads for use in magnetic recording devices.

ELECTROCHEMISTRY

Anode with Enhanced Durability

ELECTRICITE DE FRANCE *World Appl.* 97/43,465A

An anode with enhanced durability and long cycle life consists of a metallic substrate, preferably Ta, coated with a layer of electrocatalytic Ir oxide. The cycle life measured is preferably > 25 h m^2 g^{-1}. The Ir oxide layer is deposited on a prepared substrate by applying a solution of $IrCl_4$ in an organic solvent, followed by repeated thermal decomposition of $IrCl_4$.

Water Electrolysis Cell

JAPAN ENERGY CORP. *Japanese Appl.* 9/241,880

A high efficiency H_2O electrolysis cell comprises a solid polymer electrolyte of a fluoro-resin ion exchange membrane, a catalytic anode and cathode, and feeders consisting of Pt plated sintered metal powder or sintered Pt plated metal powder. This cell can decrease the amount of catalyst on the electrodes, and can depress cell voltage to a low level.

Photocatalyst for Hydrogen Production

MITSUBISHI JUKOGYO K.K. *Japanese Appl.* 9/262,473

A photocatalyst (1) used for H_2 production is composed of super micro particles, 10–1000 Å in diameter of Pt and Fe_2O_3, and an insulating matrix comprising at least one of SiO_2, Al_2O_3, Ta_2O_5, TiO_2, etc., binding them together. H_2 is produced by immersing (1) into a basic aqueous solution with pH > 10 containing organic material and irradiating it. The energy transformation ratio of this method is 3 times that of conventional methods.

Amorphous Alloy Electrolysis Anode

HIRANUMA SANGYO K.K. *Japanese Appl.* 9/279,318

An amorphous alloy for use in NaCl electrolysis contains in at.%: 65–85 Pd+Pt (with 15–40 Pt), 4–15 Cu and 10–20 Si. It has a supercooled liquid range dT_x of > 50 K, where $dT_x = T_x - T_g$ (T_x is the crystallisation temperature and T_g is the glass transition temperature). The amorphous alloy electrode has high electrolytic efficiency, good corrosion resistance, requires no activating and can be formed into shapes.

Electrodes for Electrolysis

TDK CORP. *Japanese Appl.* 9/279,381

An anode electrode for electrolytic O_2 generation has a coating layer containing at least one Pt group metal or its oxide and has orthogonal grooves, which form quadrangular pyramid and/or quadrangular frustum pyramid convex parts. The electrode is stable for long periods, has a long life and good durability, even when used in electroplating baths containing additives to promote consumption of the electrode.

ELECTRODEPOSITION AND SURFACE COATINGS

Platinum-Iridium Alloy Plating

NIPPON ELECTROPLATING ENGINEERS K.K. *Japanese Appl.* 9/256,189

A Pt-Ir alloy plating bath contains 1–30 g Ir l^{-1} of an Ir(III) complex containing halogen and either an acid or a salt, and 0.1–15 g Pt l^{-1} of a Pt(II) complex containing nitrous ion. The Pt-Ir alloy plating bath gives good deposition.

High-Purity Platinum Thin Film

MITSUBISHI MATERIALS CORP. *Japanese Appl.* 9/287,075

A thin Pt film, used in dielectric memory and in semiconductor devices, is formed on a substrate by organometallic chemical vapour deposition of an organic Pt compound by irradiation with light of wavelength ≥ 240 nm. This method forms a thin film of high-purity Pt at low reaction temperatures without deterioration of purity from decomposed ligands. Decreases in the film density by Pt coagulating into island shapes on the surface are also prevented.

Platinum Electroless Plating Liquid

JAPAN ENERGY CORP. *Japanese Appl.* 9/287,078

A Pt electroless plating liquid for plating the skin layer of electronic components contains a Pt nitro complex, a complexing complex such as ethylene diamine, a Pt nitroammine complex, a Pt chloroammine complex, a stabiliser such as ethylene amine, etc., a reducer such as B, and an additive, which tautomerises into a thiol compound. Plating is performed at pH 11–13.5 and 20–50°C. The liquid gives excellent bath stability and stable plating at low temperature.

APPARATUS AND TECHNIQUE

Oxygen Sensor

TOYOTA JIDOSHA K.K. *Japanese Appl.* 9/229,900

An oxygen sensor comprises a tube with inner and outer electrodes. A Pt coating layer is formed on the front face of a Si nitride heater, to deter Si sublimation from the heater at high temperature. The output characteristics of the sensor are maintained over a long time and the effective area of the electrode is maintained by the prevention of Si adhesion.

Sampling Uranium Oxide Fuel

MITSUBISHI JUKOGYO K.K. *Japanese Appl.* 9/276,658

NOx gas treatment equipment for sampling U oxide fuel has a catalyst containing Pt and Rh, arranged in a catalytic reaction treater, which accepts exhaust gas from the upper gas space of a coolant chamber of a cooling treater. The equipment is compact in structure and easy to install in an airtight analysis box. It eliminates gas, such as NO.

HETEROGENEOUS CATALYSIS

Purification of Diesel Engine Exhaust Gases

DEGUSSA A.G. *European Appl.* 800,856A

A catalyst for purifying diesel engine exhaust gases contains zeolites and a Pt group metal deposited on metal oxide(s) selected from Al silicate, Al_2O_3 and TiO_2. The Al silicate has a weight ratio of SiO_2:Al_2O_3 of 0.005–1. The catalyst can oxidise long chain heavy paraffins in the exhaust gas and simultaneously reduce the NOx despite the high O_2 content of the diesel exhaust gas.

Polyhydroxycarboxylic Acids

AKZO NOBEL N.V. *World Appl.* 97/34,861A

Polyhydroxycarboxylic acids are prepared by oxidation of di-, tri-, oligo- and polysaccharides in an alkaline medium with an oxygenous gas using Pd/carrier as a catalyst and Bi as promoter. The Pd concentration is ≥ 40 mg l^{-1} and the molar ratio Pd:Bi is 1:5–1:40. Towards the end of the reaction, when the O_2 concentration in the liquid phase greatly increases, the O_2 supply is reduced to ≤ 20 ppm. This process gives higher conversions and minimises catalyst deactivation and product contamination by Pd.

Vinyl Ester Production

HOECHST CELANESE CORP. *World Appl.* 97/36,679A

A catalyst for producing vinyl esters, especially vinyl acetate, comprises a honeycomb carrier with SiO_2 coated cells extending the entire length of the carrier; and Pd and Au metals distributed throughout the SiO_2 coat. The catalyst has high activity and selectivity, long life and lower pressure drop across the catalyst. Heat distribution is improved. The SiO_2 coated honeycomb carriers eliminate problems with cracking and brittleness which could occur with honeycombs containing only SiO_2 or Al_2O_3.

Three-Way Catalyst

ARD CO. PTE. LTD. *World Appl.* 97/40,923A

An exhaust gas purification catalyst comprises a carrier; a first catalyst layer made from magnetite, Ce oxide and Re which provides an O_2 reservoir during catalysis; and a second layer comprising fine Ni needles distributed over the catalyst surface and a Pt group metal, preferably Pt. The three-way conversion catalyst is manufactured by applying a first catalyst layer to the carrier; immersing in a Ni^{2+} solution to form a Ni washcoat; autoclaving to form Ni needles then adding a coating of a Pt group metal. The catalyst has good stability at high temperature.

Palladium-Gold Catalyst

HOECHST CELANESE CORP. *World Appl.* 97/44,130A

A bimetallic Pd-Au catalyst for the production of vinyl acetate from ethylene, acetic acid and O_2 is prepared by the dispersion coating of colloidal Au on a shell dispersion coating of colloidal Pd on a porous support. The catalyst has high Au retention and is durable with long term selectivity and activity. The Pd and Au can both be deposited from organic solvent.

Benzene Saturation

UOP *U.S. Patent* 5,663,466

A process for the saturation of benzene involves passing a feedstream of 5C and/or 6C paraffinic hydrocarbons and benzene through a guard bed to remove S, admixing with a H_2-containing stream, contacting the feed with 0.1–1 wt.% Pt/Al_2O_3 catalyst and heating to 480–600°F. Controlled H_2 addition improves the efficiency and cost-effectiveness. It is used in the production of high octane gasolines.

Naphtha Reforming

UOP *U.S. Patent* 5,665,223

A catalytic composite comprises a combination of a refractory inorganic oxide support with 0.01–5 wt.% of a Group IVA metal, 0.01–2 wt.% Pt group metal and 0.05–5 wt.% Eu, with > 50% of the Eu being the oxide and the atomic ratio of Eu:Pt being $\geq$ 1:3. The catalyst has improved selectivity for hydrocarbon conversion, especially for gasoline or aromatics.

Alkane Isomerisation Catalyst

PHILLIPS PETROLEUM CO. *U.S. Patent* 5,668,074

A catalyst used in alkane and/or cycloalkane isomerisation is prepared by reducing compounds of Pt and/or Pd on an Al_2O_3 support at 300–600°C, incorporating Nb and/or Ta, heating in non-reducing gas at 300–500°C and treating with halocarbon compounds selected from fluoroalkanes and chlorofluoroalkanes at 200–500°C. The catalyst has high activity and selectivity for (cyclo)alkane isomerisation.

Three-Way Catalyst for I.C.E.

ASEC MFG. *U.S. Patent* 5,672,557

A catalyst for reducing the amount of CO, hydrocarbons and NOx in exhaust gases of I.C.E. comprises Al_2O_3, CeO_2 and/or lanthana, and optionally 5–20 wt.% of a promoter, with 0.05–5 wt.% Pd. The amount of Ce and La metals in the support is 80–300 g l^{-1} at a ratio of Ce:La of 0.3:1–10:1 and the wt. ratio of Ce + La:Al_2O_3 in the support is > 3. This Pd-only catalyst has reduced levels of Al_2O_3 (< 50%) in the support and improved durability and activity.

One-Stage Alkane Conversion

AMOCO CORP. *U.S. Patent* 5,672,796

A one-stage process for the conversion of 3–6C alkanes to a low CH_4-containing hydrocarbon product rich in aromatics involves contacting a feed comprising the alkanes with a catalyst of a H-form, partially sulfided Pt/Re-loaded aluminosilicate molecular sieve. The catalyst is used for hydrocarbon aromatisation and gives high conversions and selectivity.

Unsaturated Ester Production

HOECHST CELANESE CORP. *U.S. Patent* 5,691,267

A catalyst for the synthesis of unsaturated esters is prepared by impregnating a carrier with H_2O-soluble Au and Pd compounds, fixing them to the carrier as H_2O-insoluble Au and Pd compounds, and reducing them to Au and Pd metal. The catalyst gives improved space time yield and, in the production of vinyl acetate, reduced selectivity to CO_2, ethyl acetate and heavy end products.

Fuel Additive

PLATINUM PLUS INC. *U.S. Patent* 5,693,106

A fuel additive composition for an I.C.E. comprises a Pt group metal compound sufficient to give 0.05–2 mg Pt l^{-1} fuel and a H_2O-functional lipophilic emulsifier and/or lipophilic organic compound in which H_2O is miscible. Degradation of catalyst activity is minimised by preventing the separation of H_2O from the fuel and maintaining the catalyst in the fuel.

Removing Non-Methane Hydrocarbons

FARMTEC K.K. *Japanese Appl.* 9/113,486

Non-CH_4 hydrocarbons are removed from exhaust gas by flowing the sample gas containing hydrocarbons and O_2 through a discharge tube with an applied A.C. voltage of 10–20 kV, 50–100 Hz, and feeding to a tube containing a Pt oxidation catalyst at 100–150°C to burn the hydrocarbons, except CH_4. Non-CH_4 hydrocarbon is almost completely oxidised and removed by suppressing the oxidation rate of CH_4.

Waste Gas Purifier

HINO MOTORS LTD. *Japanese Appl.* 9/271,639

A waste gas purifier for diesel engines comprises a first Pt/Al_2O_3 catalyst, a second Rh/CeO_2 catalyst and a third catalyst comprising Al_2O_3 carrier carrying Pt, Pd or a mixture of these, arranged by the exhaust-tube path, one-by-one from the upstream side of the waste gas circulation direction. Hydrocarbon gas flow is controlled by a rate-of-flow controller. NOx is converted into N_2 and nitrous oxide in atmospheric air is significantly reduced without releasing hydrocarbon gas to the atmosphere.

Purification Catalyst for Exhaust Gas

TOYOTA JIDOSHA K.K. *Japanese Appl.* 9/271,665

A catalyst for the purification of exhaust gas is composed of a spinel type composite oxide AB_2O_4 (A = Pt, Fe, Co, Ni, Cu, Zn, Cd or Hg; B = Ce). This catalyst allows the soot in diesel engine exhaust gases to be combusted efficiently at low temperature.

Silica Gel Catalyst with Platinum

TANAKA KIKINZOKU KOGYO K.K. *Japanese Appl.* 9/276,698

A manufacturing method involves adding to a SiO_2 gel a complex Pt cation produced by the pyrogenetic reaction of Pt chloride ammonium acid with surplus aqueous NH_3, which is removed by volatilisation to give a tetravalent Pt amine complex ion. This Pt/SiO_2 hydrocarbon hydrogenation catalyst uses less Pt but retains the same catalytic properties.

Exhaust Gas Purifier

NISSAN MOTOR CO. LTD. *Japanese Appl.* 9/287,438

A purifier for an I.C.E. consists of a three-way component catalyst carrying Pd and an absorption catalyst carrying a zeolite, both on a heat resistant inorganic carrier, arranged upstream and downstream, respectively, of the exhaust gas flow to form a catalytic converter. This tandem arrangement gives the catalyst superior purification activity. It absorbs and separates hydrocarbons by self purification even when the exhaust gas temperature is low at engine start-up.

Purification of Exhaust Gases

NE CHEMCAT K.K. *Japanese Appl.* 9/290,156

A catalyst for purifying the exhaust gas from an I.C.E., gas turbine or boiler consists of Pd, Ag and Zn on an Al_2O_3 carrier. The catalyst purifies NOx in an O_2 rich environment and completely oxidises the reducing hydrocarbons. It is extremely efficient at purification, as it maintains high denitration even when the exhaust gas flows at a high velocity.

Hydrogenation of Butynediol

LINDE A.G. *German Appl.* 1/96/25,189

A two-stage process is claimed for the catalytic hydrogenation of butynediol (1) to butanediol (2). Stage I is carried out in a stirred reactor with a suspended, $Pd\text{-}Ag/Al_2O_3$ catalyst giving complete conversion of (1) into butenediol (3) and 50–85% hydrogenation of (3) to (2). Stage II takes place in a solid-bed reactor. The process gives (2) in high yield with high purity.

Palladium Exhaust Gas Purification Catalyst

MAZDA MOTOR CORP. *German Appl.* 1/97/13,103

A Pd-carrying exhaust gas purification catalyst comprises CeO_2 and a mixed oxide of Ce and Pr. The catalyst is produced by mixing a porous base material with CeO_2 to form a carrier for the Pd; the Pd and carrier is then made into a slurry with a mixed oxide of Ce and Pr as solid components, followed by calcining. The catalyst has high heat resistance.

HOMOGENEOUS CATALYSIS

Preparation of Aldehydes and Ketones

ZENECA LTD. *British Appl.* 2,312,209A

Aldehyde or ketone derivatives (1) are prepared by oxidising an alcohol with O_2 in the presence of a catalytic amount of a tetra-alkylammonium Ru species under anhydrous conditions. (1) are useful as intermediates and products in the chemical industry.

Diaryl Carbonate Production

BAYER A.G. *European Appl.* 794,168A

A diaryl carbonate is produced by reacting the corresponding aromatic hydroxyl compound with CO and O_2 in the presence of a Pt metal catalyst, a cocatalyst, a quaternary salt and a base. Also claimed is the production of polycarbonates. The energy-coupled process with a closed material cycle avoids the use of phosgene and solvent, is easy to operate and gives pure products with a selectivity of > 99%.

Hydrogen Peroxide Production

ENICHEM S.p.A. *European Appl.* 808,796A

H_2O_2 is obtained by reacting CO, O_2 and H_2O vapour in a H_2O immiscible organic solvent in the presence of a soluble catalyst formed from a Pd salt, a non co-ordinating organic or inorganic acid, and a ligand comprising a mono or polydentate nitrogenated compound which binds to Pd. High H_2O_2 yields are obtained with lower amounts of ligand and acid. It is used as a bleaching agent in the textile and paper manufacturing industries; in oxidation processes in the chemical industry or as a biocide.

Ethylidene Diacetate Production

AIR PROD. & CHEM. INC. *European Appl.* 808,820A

Ethylidene diacetate (EDA) is produced by reacting acetic anhydride, H_2, CO and acetic acid in the presence of an alkyl iodide and a catalyst which is stable to hydrogenation. The catalyst is bifunctional and comprises an insoluble polymer with pendant quaternised heteroatoms, some of which are ionically bonded to anionic Group VIII metal complexes and the remainder to iodide. Accelerators, such as 3-picoline, are not required and leaching of metal from the catalyst is minimised by bonding to the Group VIII metal. The catalyst can be recycled and the process is fast and highly selective towards EDA.

Preparation of Pesticidal Fluoro-Olefins

AMERICAN CYANAMID CO. *European Appl.* 811,596A

Pesticidal fluoro-olefins (1) are prepared by reacting a 4-aryl-2-fluoro-2-butene-1-ol with a brominating agent to form a 4-aryl-1-bromo-2-fluoro-2-butene and reacting with a Pd catalyst, a base and a boronic acid, boronic anhydride or borate ester. This is an efficient and effective method for the preparation of pesticidal agents (1).

Carboxylic Acid Production

RHONE-POULENC CHIM. *World Appl.* 97/35,826A

Carboxylic acids and/or their corresponding esters are prepared by the isomerisation of formic acid ester and an alcohol in the presence of H_2O, a solvent and an Ir-based catalyst with a halogen promoter, under partial CO pressure. With alcohols containing more than one OH, adipic acid (or esters) or terephthalic acid (or esters) can be produced. This process gives improved productivity without the addition of supplementary compounds such as strong acids.

Pentenoic Acid and Pentenoate Ester

F. P. W. AGTERBERG *U.S. Patent* 5,672,732

A pentenoic acid (1) or a pentenoate ester (2) is prepared with good selectivity and conversion by the carbonylation of butadiene or its derivatives in the presence of CO, an alcohol or H_2O and a catalyst system comprising Pd, a carboxylic acid and a monodentate phosphine ligand. (1) and (2) can be used as intermediates in the preparation of ε-caprolactam and adipic acid, in nylon-6 and nylon-6,6 production, respectively. Good selectivity and conversions are achieved. The catalyst system is stable and may be reused several times without loss of activity.

Alkoxy-Silane Compounds

BASF A.G. *German Appl.* 1/96/49,998

The preparation of alkoxy-silane compounds containing vinyl ether groups comprises reacting divinyl ethers (1) with silanes (2) at 70–150°C in the presence of a homogeneous hydrosilation catalyst. The catalyst is a Pt or Rh compound and the amount of Rh or Pt is 0.05–10 ppm with respect to (1) and (2).

FUEL CELLS

Fuel Cell Electrode

S. SARANGAPANI *U.S. Patent* 5,683,829

A fuel cell electrode comprises an anode with a Pt electrocatalyst including a redox promoter composed of a Ru or Sn complex. The anode is resistant to poisoning, and low loadings of Pt are needed to give higher current densities. The electrode is used in the oxidation of MeOH or MeOH reformate in a fuel cell, and the fully assembled fuel cells may be of stack design.

Anode Catalyst

STONEHART ASSOC. INC. *Japanese Appl.* 9/161,811

An anode for high molecular electrolyte-type fuel cells comprises 84–99 at.% Pt and 1–16 at.% Fe held on a catalyst support. The anode catalyst has a long life, superior poisoning resistance and is free from elution.

Pt-Fe Alloy Fuel Cell Electrode

EQUOS RES. K.K. *Japanese Appl.* 9/206,597

An electrode catalyst for fuel cells or electrolysis cells contains a Pt-Fe alloy with a tetragonal crystal structure. The electrode catalyst reduces the concentration overvoltage, and allows higher utilisation of fuel and air electrodes, resulting in a higher output, even with lowered partial pressures of air or fuel gas.

Electrode Structure

MATSUDA K.K. *Japanese Appl.* 9/265,992

The electrode structure of a solid state polymer fuel battery used for electric vehicles includes a set of catalytic electrodes with two catalyst layers between which a solid state polymer electrolyte film is sandwiched. The first catalyst layer consists of a polytetrafluoroethylene (1) dispersion solution mixed with C black containing 40% Pt, and the second layer consists of (1) mixed with C and 20% Pt. The electrode improves the electricity generation efficiency and reduces manufacturing costs.

Electrode Catalyst for Fuel Cells

TOSHIBA K.K. *Japanese Appl.* 9/293,517

An electrode catalyst layer for phosphoric acid fuel cells is manufactured by heat treating a mixture of C and fluoro resin, which has been uniformly applied to a support substrate. C is eliminated, giving a fluoro resin sheet onto which a catalyst layer is formed by impregnation with Pt and C. Reduction in surface area is prevented, and battery characteristics and the water proof nature of the catalyst layer are improved.

Zeolite Based Platinum Catalyst

DAIMLER-BENZ A.G. *French Appl.* 2,744,999

A zeolite based Pt catalyst is used in the catalytic reduction of CO from a starting mixture rich in H_2 and in the selective oxidation of CO from a MeOH reforming reactor. The catalyst is produced by dissolving $Pt(NH_3)_4Cl_2.xH_2O$ in distilled H_2O and adding a zeolite, stirring the suspension, filtering, washing, drying, heating, reducing the heated material by adding a forming gas, and finally cooling under N_2. The catalyst is used in H_2 processing for use in fuel cells for electrical vehicles.

ELECTRICAL AND ELECTRONIC ENGINEERING

Wireless Bonding of IC Chips

TANAKA DENSHI KOGYO K.K. *European Appl.* 810,293A

A Au alloy wire containing 0.2–5 wt.% Pd and 1–100 ppm (by wt.%) Bi is manufactured from Au of purity ≥ 99.99 wt.%. A Au alloy bump is formed by forming a ball at the end of a Au alloy wire passing through in a capillary, bonding the ball to an electrode of an IC chip, and breaking the wire from the ball. The process is used for wireless bonding of IC chips. High bond strength is maintained at high temperatures.

Semiconductor Chip Package

MICRON TECHNOLOGY INC. *U.S. Patent* 5,677,566

A semiconductor chip package for connection to a lead frame has conductive leads connected to the chip and passing over the top, connected to bond pad areas on the chip via bond wires. The leads are coated with Pd/Ni, Au or Ag, and the chip and leads are encapsulated by a thermosetting epoxy resin. This package can be used with standard formats developed for larger chips without reconfiguration.

Fluoro-Polymer Metallised Substrate

GEO-CENTERS INC. *U.S. Patent* 5,696,207

A fluoropolymer substrate with a metallised surface is prepared by contacting a fluoro-polymer substrate with an electroless metallisation catalyst, selected from Pd, Rh, Ir, Ni, Cu, Ag and Au, and then with an electroless metallisation solution. The metallised surface comprises a conductive layer of Ni, Cu, Au, Pt, Pd, Co, or an alloy, an intermediate layer of Ni and an outer layer of Pt, Au, Cu or alloys of Ni or Pt. The metallised surface exhibits good adhesion to the fluoropolymer substrate and may be patterned.

Ferroelectric Capacitor

NIPPON TEXAS INSTR. K.K. *Japanese Appl.* 9/223,779

A ferroelectric capacitor for a memory cell in a semiconductor device has a lead zirconate titanate (PZT) film formed between upper and lower Pt electrodes. The lower electrode has a thin (0.5–1 nm) Ti film on the side of a SiO_2 insulating layer and a Pt film on the side of the PZT film. Improved surface adhesion is obtained and increases in the capacitor resistance are prevented. Favourable conductivity is ensured.

Magnetic Recording Medium

KUBOTA CORP. *Japanese Appl.* 9/231,542

A thin metal film type magnetic recording medium consists of a laminated structure of a non-magnetic substrate, a base layer (1–6 at.% W), a magnetic layer (8–16 Cr, 4–7 Ta and 3–6 Pt (all in at.%) and the balance Co) and an overcoat layer. The medium has improved coercive force and improved recording density. Sputtering film is easily formed.

Ruthenium Thin Films

FUJITSU LTD. *Japanese Appl.* 9/246,214

Ru or Ru oxide thin films are prepared from Ru(DMHPD), (1), where DMHPD = 2,6-dimethyl-3,5-heptanedione, by chemical vapour deposition. Also claimed is the preparation of a semiconductor device using the above thin films. Due to a stable supply of (1), thin films of uniform quality are obtained. C impurities are reduced by the introduction of H_2.

Sintering Material Composition

MITSUBISHI MATERIALS CORP. *Japanese Appl.* 9/272,969

A sintering material composition for opto-magnetic recording medium manufacture comprises an alloy containing 38–55 Mn, 35–55 Sb and 1–15 Pt, all in at.%. The alloy is very strong, prevents crack generation during sputtering and has thermal shock resistance. High density recording media can be produced.

Semiconductor Composition

NIPPON STEEL CORP. *Japanese Appl.* 9/275,119

A semiconductor for an IC, with an Al-containing alloy electrode formed on the semiconductor substrate, has a bonding wire welded to the electrode and resin sealed at the junction. The composition of the bonding wire includes (in wt.%): 0.005–2.5 Cu and Mn, 0.001–5 Pd and Pt, 0.0001–0.05 In, Sc, Ga, Si and Al, and 0.0002–0.03 of Ca, Be, La, Ce and Y.

Ferroelectric Element

MATSUSHITA DENKI SANGYO K.K. *Japanese Appl.* 9/280,947

A ferroelectric element, for pyroelectric type infrared sensors, etc., has a contact layer made of a Ti film, which is arranged between a MgO single crystal substrate and a lower electrode made of Pt film. The element eliminates rupture and and improves the yield in the manufacture of ferroelectric elements.

Semiconductor Chip Joining

WORLD METAL K.K. *Japanese Appl.* 9/283,557

A semiconductor chip joining method uses flip chip bonding, sequentially depositing a thin base layer of Pd-X alloy (X = Zn, Pb, etc.), a Ni layer and a metal layer, by non-electrolytic plating, on the surface of an input/output terminal. The chip improves the corrosion resistance of the input/output terminal and the junction reliability and allows high density mounting.

The New Patents abstracts have been prepared from material published by Derwent Information Limited.