

# NEW PATENTS

## PHOTOCONVERSION

### Photocatalytic Substrate Active under Visible Light

SAINT-GOBAIN GLASS FRANCE *World Appl.* 2005/102,952

A transparent glass substrate, used for glazing, contains a mechanically resistant, long-lasting coating, of a photocatalytic active compound containing a thin layer of Pt, Rh or Pd, closely associated with a doped GaP, CdS, TiO<sub>2</sub>, etc. An energy jump of 1.55-3.26 eV occurs between the upper level of the valence band and the lower level of the conductive band, corresponding to a wavelength in the visible field.

## APPARATUS AND TECHNIQUE

### Titania Nanotube Arrays for Use as Sensors

THE PENN RES. FOUNDATION *U.S. Appl.* 2005/224,360

An electrical resistive device (1) for sensing H<sub>2</sub> gas includes: an array of TiO<sub>2</sub> nanotubes (1) formed by anodising a Ti layer; and a plurality of Pd (or other noble metal) clusters on top, mechanically supported by an integral member. (1) may contain dopant of < 1 mass% of Pd, Pt, Ru, Sb, etc. In O<sub>2</sub>, (1) photocatalytically removes contaminants (liquid crude petroleum, pathogens, etc.) by exposure to radiant energy emitted within frequency range from visible to ultraviolet.

### Integrated Capacitive Microfluidic Sensors

CALIFORNIA INST. TECHNOL. *U.S. Appl.* 2005/243,500

A microfluidic device for capacitive pressure sensing, includes a fluid channel, a cavity region, and a polymer-based membrane in between. Additionally, the device includes two capacitor electrodes, consisting of Pt, Au, Al, Cr, Ti and doped polysilicon, coupled to the membrane and the cavity region, and an electrical power source placed between which causes an electric field within the cavity region.

### VCSEL Structure with Platinum Sublayer

HONEYWELL INT. INC *U.S. Appl.* 2005/243,886

A vertical cavity surface emitting laser (VCSEL) with high reflectivity and heat dissipation characteristics includes a bottom distributed Bragg reflector (1) on a substrate; a metal layer (2), including a reaction barrier sublayer of Pt, W and/or Ti interposed between (1) and the substrate, forming a composite mirror structure. A patterned dielectric layer may be interposed between to reduce a deleterious chemical reaction between (2) and (1).

### Ammonia Gas Sensor Having Improved Detection

FIS INC *Japanese Appl.* 2005-127,743

An NH<sub>3</sub> gas sensor, with improved accuracy, comprises a semiconductor embedding a coil-like heater made of Pt or a Pt alloy acting as a substrate and a conductor-like electrode in a gas sensitive body (1) formed into a spherical shape. (1) is mainly made of Sn oxide and contains Au, to suppress the disturbance of NH<sub>3</sub> detection output by Pt.

## HETEROGENEOUS CATALYSIS

### Elimination of Aldehydes by Catalytic Oxidation

HENKEL KG *European Appl.* 1,591,156

Aldehydes are eliminated by catalytic oxidation in the presence of a three-component catalyst comprising a catalytic composition of Ru/ZrO<sub>2</sub>-MO<sub>x</sub> where M is Ca, Mn, Cu and/or In; x = 0.2-3, especially 0.5-2 (the respective upper and lower limiting values are included). The process may be run at relatively moderate (for example, ambient) temperatures leading to a high conversion rate of aldehydes, thus resulting in harmless degradation products, especially CO<sub>2</sub> and H<sub>2</sub>O.

### Platinum Catalysts Formed by *in Situ* Reduction

DE NORA ELETTRODI SPA *World Appl.* 2005/097,314

A C-supported Pt black catalyst (1) is obtained by chemical reduction of *in situ*-formed Pt dioxide (2) by conversion of dihydrogen hexahydroxyplatinate precursor on a C black support, with an active area of 50 m<sup>2</sup> g<sup>-1</sup>. The reducing agent is H<sub>2</sub>, formaldehyde, etc. (1) is obtained by variation of pH and/or temperature (120-500°C) and can be incorporated in a gas diffusion electrode or in a coated membrane.

### Catalyst Used for the Oxidation of Hydrogen

BASF AG *World Appl.* 2005/097,715

A supported catalyst (1) for the oxidation of H<sub>2</sub> in a hydrocarbon dehydrogenation process comprises α-Al<sub>2</sub>O<sub>3</sub> carrying 0.01-0.1 wt.% Pt and 0.01-0.1 wt.% Sn, with the Pt:Sn ratio being 1:4 to 1:0.2, relative to the total weight of the catalyst. Also disclosed are methods for oxygenating H<sub>2</sub> and for dehydrogenating hydrocarbons using rows of integrated reactors with (1).

### Removal of Carbon Monoxide and Hydrocarbons

HTE AG *World Appl.* 2005/102,513

Simultaneous removal of CO and hydrocarbons from O-rich exhaust gases is carried out in the presence of a catalyst (1) containing SnO<sub>2</sub> and Pd supported on a carrier oxide, such as a zeolite, being in a roentgenographically amorphous or nanoparticle form. (1) contains 3-50 wt.% SnO<sub>2</sub>; and 0.2-10 wt.% Pd and, optionally, Pt, Rh, Ir and Ru; based on the mass proportions relatively to the carrier oxide. (1) may also contain B oxide and/or other promoters.

### Catalyst Prepared by Microwave Heating

DOW GLOBAL TECHNOL. *World Appl.* 2005/102,525

A hydro-oxidation catalyst (1) for the hydro-oxidation of a hydrocarbon, preferably a C3-C8 olefin, such as propylene, by O<sub>2</sub> in the presence of H<sub>2</sub> to the corresponding partially-oxidised hydrocarbon, such as propylene oxide is presented. (1) comprises Pt group metal(s), and/or Au, Ag, lanthanide rare earth metals, deposited on a titanosilicate, preferably TS-1, which is prepared by microwave heating.

### Supported Ruthenium Nanoparticle Catalyst

UNIV. HONG KONG *World Appl.* 2005/102,971

Oxidation of alkenes is carried out on Ru nanoparticle catalysts (1-100 nm in size), with Mn and Fe nanoparticles, grafted on an inert solid support, such as hydroxyapatite. The reaction yields a *cis*-1,2-diol from an alkene, an oxidant and acid at -78 to 40°C. The catalyst effects *cis*-dihydroxylation and oxidative cleavage of alkenes to give the respective *cis*-diols and carbonyl products. The catalyst can be separated by filtration or centrifugation, and reused.

### Modified Carbon Supported Palladium Catalyst

CSIR *U.S. Patent* 6,963,016

A highly active modified C supported Pd catalyst (1) containing 2-6 wt.% Pd, is produced by the simultaneous impregnation of activated C with Pd and organic Al precursors, such as Pd chloride and Al isopropoxide, respectively, in a tetraethyl ammonium hydroxide aqueous solution. (1) is used for the hydrodechlorination of dichlorodifluoromethane to produce difluoromethane, at 250°C and a gas hourly space velocity of 4800 h<sup>-1</sup>.

## HOMOGENEOUS CATALYSIS

### Palladium Catalysed Indolisation

BOEHRINGER INGELHEIM INT. *World Appl.* 2005/090,302

Substituted indole compounds (1) were synthesised by reacting a 2-bromoaniline or 2-chloroaniline with a substituted acetylene in the presence of a Pd(OAc)<sub>2</sub> catalyst, 1,1'-bis(di-*n*-butylphosphino)ferrocene ligand, and K<sub>2</sub>CO<sub>3</sub> base, in 1-methyl-2-pyrrolidinone solvent at 110-140°C. (1) are used in the field of pharmaceuticals and more specifically in processes for making substituted indole compounds.

### Optically Active Polymers

NAT. INST. ADV. IND. SCI. TECHNOL. *U.S. Patent* 6,962,962

An optically optically active polymer (1) is obtained by polymerising a chiral alkoxy-substituted phenylacetylene, such as *p*-(2-methylbutoxy)phenylacetylene in which the 2-methylbutoxy group has chirality, in an organic solvent, such as triethylamine, in the presence of [Rh(norbornadiene)Cl]<sub>2</sub> catalyst. (1) has a larger optical rotation than the monomeric compound *per se* and shows different colours, depending on the organic solvent used: the yellow polymer turns black on exposure to CHCl<sub>3</sub>, then back to yellow by re-precipitation from a CHCl<sub>3</sub> solution, on MeOH addition.

## FUEL CELLS

### Production of Platinum-Ruthenium Alloy Catalyst

HITACHI MAXELL LTD *Japanese Appl.* 2005-177,661

A Pt-Ru alloy catalyst is made by dissolving a Pt and a Ru salt or complex in an organic alcohol solvent. C powder is dispersed in the alcohol solution, which is then heated while refluxing alcohol. The Pt-Ru/C powder is filtered, then heat treated at 300-500°C in an inert atmosphere. Pt-Ru/C exhibits high activity when MeOH is oxidised and used in a fuel cell.

### Electrode Catalyst for PEFCs

NISSAN MOTOR CO LTD *Japanese Appl.* 2005-196,972

Electrode catalysts (1) for use in PEFCs are manufactured by mixing Rh chloride-containing and Pt ion-containing reversed micelle solutions. Reducing agents, such as hydrazine, Na borohydride, etc., are added and conductive C supports are dispersed in the solution for loading composite metal particles onto the support. (1) have high activity and durability.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Ferroelectric Capacitor with a Template

TEXAS INSTRUMENTS INC *U.S. Appl.* 2005/230,725

A ferroelectric capacitor (1) comprises: a first electrode layer, including Ir, located over a substrate. An oxide electrode template (2) (20-100 nm thick) is located on the first electrode layer and includes perovskites: SrIrO<sub>3</sub>, SrRuO<sub>3</sub>, PbIrO<sub>3</sub>, PbRuO<sub>3</sub>, etc. (1) may include a ferroelectric dielectric layer over the oxide electrode template and a second electrode layer over the ferroelectric dielectric layer (2). (1) is used in ferroelectric random access memory devices.

### TiW Platinum Interconnect

ANALOG DEVICES INC *U.S. Patent* 6,956,274

A metallisation stack used as a contact structure in integrated MEMS devices, particularly optical MEMS and Bio-MEMS, comprises a Ti-W adhesion and a barrier layer (1) with a Pt layer on top. (1) is formed by sputter etching the Pt in Ar, followed by a wet etch in *aqua regia* using an oxide hardmask. Alternatively, the Ti-W and Pt layers are deposited sequentially and patterned by a single plasma etch process with a photoresist mask.

## MEDICAL USES

### Radiopaque and MRI Compatible Nitinol Alloys

ADV. CARDIOVASC. SYST. INC *World Appl.* 2005/102,407

A medical device, such as a stent, is made from radiopaque and magnetic resonance imaging compatible alloy, for use with, or implanted in, a body lumen. It has improved radiopacity, retains superelastic and shape memory behaviour, and has a thin strut/wall thickness for high flexibility. The stent is made from alloy (1) such as Ni-Ti (nitinol), and includes a ternary element of Ir, Pt, Pd, Rh, Ru, Au, Re, etc. A balloon-expandable stent made from (1) is claimed.

### Supramolecular Photoactivated DNA Cleavage

VIRGINIA TECH INTELL. PROP. *U.S. Patent* 6,962,910

Replication of hyperproliferating cells is decreased by using a supramolecular metal complex as a DNA cleaving agent to transfer charge from MLCT light absorbing metal, Ru or Os, to electron acceptor metal, Rh, by a bridging  $\pi$ -acceptor ligand. A bioactive MLCT state that can cleave DNA is thus generated. The complexes are tunable and can cleave DNA by low energy light in the absence of O<sub>2</sub>.