

# ABSTRACTS

of current literature on the platinum metals and their alloys

## PROPERTIES

### Probing the Interface in Vapor-Deposited Bimetallic Pd-Au and Pt-Au Films by CO

#### Adsorption from the Liquid Phase

D. FERRI, B. BEHZADI, P. KAPPENBERGER, R. HAUERT, K.-H. ERNST and A. BAIKER, *Langmuir*, 2007, 23, (3), 1203–1208

PVD was used to prepare Pt, Pd, Au, Pt-Au and Pd-Au films. Their surfaces were characterised by XPS, AFM and CO adsorption from liquid  $\text{CH}_2\text{Cl}_2$  monitored by ATR-IR spectroscopy. The changes observed in the IR frequency and in the shape of the CO signals upon adsorption indicated that morphological changes occur in the Pd films when decreasing the film thickness from 2 to 0.2 nm and when introducing a 1 nm Au film. The Pt-Au surfaces were less sensitive toward CO adsorption.

### Electric Field-Induced Modification of Magnetism in Thin-Film Ferromagnets

M. WEISHEIT, S. FÄHLER, A. MARTY, Y. SOUCHE, C. POINSIGNON and D. GIVORD, *Science*, 2007, 315, (5810), 349–351

The magnetocrystalline anisotropy of ordered FePt and FePd intermetallic compounds can be reversibly modified by an applied electric field when immersed in an electrolyte (propylene carbonate and  $\text{Na}^+\text{OH}^-$ ). A voltage change of  $-0.6$  V on 2 nm thick films altered the coercivity by  $-4.5$  and  $+1\%$  in FePt and FePd, respectively. The modification of the magnetic parameters is attributed to a change in the number of unpaired  $d$  electrons.

### Hydrogen-Induced Stress Relaxation in Thin Pd Films: Influence of Carbon Implementation

R. NOWAKOWSKI, P. GRZESZCZAK and R. DUS, *Langmuir*, 2007, 23, (4), 1752–1758

The influence of C impurities on mechanical properties of thin Pd film/ $\text{H}_2$  has been investigated *in situ* by AFM. The systems characterised by C incorporation from the two opposite sides of thin Pd film (HOPG substrate and HC fragments deposit from a gas-phase reached by preadsorption of ethylene) are compared. During  $\text{PdH}_x$  decomposition, C impurities induce creation of an organised network of cracks which divides the continuous film into separated domains.

### Hydrogen Sorption Properties of Ternary Intermetallic Mg–(Ir,Rh,Pd)–Si Compounds

T. SPASSOV, S. TODOROVA, W. JUNG and A. BORISSOVA, *J. Alloys Compd.*, 2007, 429, (1–2), 306–310

$\text{Mg}-(\text{Ir,Rh,Pd})-\text{Si}$  (1) with the highest Mg content ( $\text{Mg}_{15}\text{Ir}_5\text{Si}_2$  with channel-like structure) reveals the highest electrochemical H capacity. Generally the capacities of (1) studied are low. Refining the particle size and microstructure of (1) did not result in any significant H-capacity increase.

## CHEMICAL COMPOUNDS

### Reactivity Studies of Rhodium Porphyrin Radical with Diazo Compounds

L. ZHANG and K. S. CHAN, *Organometallics*, 2007, 26, (3), 679–684

Rh(II) tetramesitylporphyrin, Rh(tmp), reacted with ethyl diazoacetate and (trimethylsilyl)diazomethane to give Rh(III) porphyrin alkyls. Mechanistic studies showed that Rh(tmp) was coordinated with a diazo compound, which then underwent a rapid H atom abstraction *via* C–H bond activation to give Rh(tmp)H. This subsequently reacted with a second molecule of the diazo compound in the rate-determining step to give Rh(tmp) alkyl and  $\text{N}_2$ .

### Structural and Magnetic Study of $\text{N}_2$ , NO, $\text{NO}_2$ , and $\text{SO}_2$ Adsorbed within a Flexible Single-Crystal Adsorbent of $[\text{Rh}_2(\text{bza})_4(\text{pyz})_n]$

C. KACHI-TERAJIMA, T. AKATSUKA, M. KOHBARA and S. TAKAMIZAWA, *Chem. Asian J.*, 2007, 2, (1), 40–50

$[\text{Rh}_2(\text{bza})_4(\text{pyz})_n]$  (1) exhibits gas adsorbency. The structures obtained were characterised as (1)·1.5  $\text{N}_2$  (298 K), (1)·2.5  $\text{N}_2$  (90 K), and (1)·1.95 NO (90 K) under forcible adsorption conditions and (1)·2  $\text{NO}_2$  (90 K) and (1)·3  $\text{SO}_2$  (90 K) under ambient pressure. The NO inclusion crystal exhibited antiferromagnetic interaction between the NO molecules and paramagnetism arising from the NO monomer.

### Ordered Arrays of Organometallic Iridium

#### Complexes with Long Alkyl Chains on Graphite

J. OTSUKI, T. TOKIMOTO, Y. NODA, T. YANO, T. HASEGAWA, X. CHEN and Y. OKAMOTO, *Chem. Eur. J.*, 2007, 13, (8), 2311–2319

*fac*- $[\text{Ir}(\text{ppy})_3]$  complexes having long alkyl chains were shown to form lamellar arrays at a 1-phenylotane/HOPG interface. From STM images, it is concluded that the molecules align with alkyl chains being interdigitated. Similar lamellar arrays were also obtained at the air/HOPG interface upon drop-casting of toluene solutions.

## ELECTROCHEMISTRY

### Ruthenium–Ligand Complex, an Efficient Inhibitor of Steel Corrosion in $\text{H}_3\text{PO}_4$ Media

M. BENABDELLAH, R. TOUZANI, A. DAFALI, B. HAMMOUTI and S. EL KADIRI, *Mater. Lett.*, 2007, 61, (4–5), 1197–1204

The effect of a macrocycle Ru complex (1) on the corrosion of steel in  $\text{H}_3\text{PO}_4$  was investigated. Inhibition efficiency (E%) increased with concentration of (1). Electrochemical impedance spectroscopy showed that the dissolution process of the steel occurs under activation control. Polarisation curves indicate that (1) acts as a cathodic inhibitor.

## PHOTOCONVERSION

### Phosphorescent Dyes for Organic Light-Emitting Diodes

P.-T. CHOU and Y. CHI, *Chem. Eur. J.*, 2007, 13, (2), 380–395

Highly emissive, charge-neutral Pt, Ir, Os and Ru complexes (1) with chelating C-linked 2-pyridylazole ligands were synthesised. The photophysical properties of (1) were investigated using spectroscopy, relaxation dynamics, and theoretical approaches, from which the lowest-lying excited states, competitive radiative decay, and radiationless processes were then analysed. The potential use of (1) in OLEDs was evaluated.

### Tris(2,2'-bipyridyl)ruthenium(II) Chemiluminescence Enhanced by Silver Nanoparticles

B. A. GORMAN, P. S. FRANCIS, D. E. DUNSTAN and N. W. BARNETT, *Chem. Commun.*, 2007, (4), 395–397

Mixtures of Ag(I) and citrate ions that are used to produce Ag nanoparticles induce intense chemiluminescence with Ru(bpy)<sub>3</sub><sup>2+</sup> and Ce(IV), which can be utilised for the determination of citrate ions and other analytes. Solutions of glycine, proline and tartaric acid (5 × 10<sup>-3</sup> M) that contained AgNO<sub>3</sub> (2.5 × 10<sup>-3</sup> M) gave chemiluminescence with Ru(bpy)<sub>3</sub><sup>2+</sup> and Ce(IV) that was ~ two orders of magnitude more intense than for solutions without AgNO<sub>3</sub>.

## SURFACE COATINGS

### Hot Corrosion Behavior of Pt-Ir Modified

#### Aluminide Coatings on the Nickel-Base Single Crystal Superalloy TMS-82+

Y. N. WU, A. YAMAGUCHI, H. MURAKAMI and S. KURODA, *J. Mater. Res.*, 2007, 22, (1), 206–216

Pt-Ir films (Ir = 0, 32, 46, 83, 100 at.%) were deposited on TMS-82+ by magnetron sputtering. After annealing and aluminising, the Pt-Ir modified aluminide coatings (1) mainly consisted of PtAl<sub>2</sub> and β-(Ni,Pt,Ir)Al phases. The hot corrosion resistance of (1) was evaluated by exposure at 1173 K in the presence of 90 wt.% Na<sub>2</sub>SO<sub>4</sub> + 10 wt.% NaCl. The lowest mass gain (0.299 mg cm<sup>-2</sup>, after 100 h) was for Pt-46Ir due to formation of a dense, continuous protective Al<sub>2</sub>O<sub>3</sub> scale. Phase transformation from β-(Ni,Pt)Al to γ'-(Ni,Pt)<sub>3</sub>Al and protection by Pt/Ir enriched layer had important effects on the corrosion of (1).

### Batch CVD Process for Depositing Pd Activation Layers

L. WANG and G. L. GRIFFIN, *J. Electrochem. Soc.*, 2007, 154, (3), D151–D155

CVD was employed for depositing a Pd activation layer for subsequent electroless Cu deposition. The process uses a continuous Pd(hfac)<sub>2</sub> precursor transfer step followed by a batch H<sub>2</sub> reduction step. The resulting layer contains both isolated Pd(0) clusters and dispersed Pd(II) species. Deposited Cu films showed poor adhesion upon drying, which is attributed to weak film attachment at the Pd(II) sites.

## APPARATUS AND TECHNIQUE

### Platinum Decorated Carbon Nanotubes for Highly Sensitive Amperometric Glucose Sensing

J. XIE, S. WANG, L. ARYASOMAYAJULA and V. K. VARADAN, *Nanotechnology*, 2007, 18, (6), 065503

Fine Pt nanoparticles were deposited on functionalised C MWNTs using a decoration technique. An enzymatic Pt/C MWNTs paste-based mediated glucose sensor (1) was fabricated. Improved sensitivity for glucose sensing was shown by (1) without using any picoampere booster or Faraday cage. The calibration curve exhibited a good linearity in the glucose concentration range of 1–28 mM.

### A Room Temperature Si<sub>3</sub>N<sub>4</sub>/SiO<sub>2</sub> Membrane-Type Electrical Substitution Radiometer Using Thin Film Platinum Thermometers

G. ALLÈGRE, B. GUILLET, D. ROBBES, L. MÉCHIN, S. LEBARGY and S. NICOLETTI, *Meas. Sci. Technol.*, 2007, 18, (1), 183–189

The temperature control of the title radiometer, using two control loops and a chopping procedure, was investigated. Sensing and heating elements were patterned in a Pt thin film, deposited on a 1560 μm × 1560 μm membrane made of a 280 nm thick Si<sub>3</sub>N<sub>4</sub>/SiO<sub>2</sub> bilayer. The sample was fabricated in a 500 μm thick Si substrate by chemical anisotropic micromachining and then passivated with a 1 μm thick SiO<sub>2</sub> layer. The device was operated in a primary vacuum chamber, with no coolant or large heat sink other than the sample holder itself.

### Measurement and Modeling of Hydrogen Transport through High-Flux Pd Membranes

F. C. GIELENS, H. D. TONG, M. A. G. VORSTMAN and J. T. F. KEURENTJES, *J. Membrane Sci.*, 2007, 289, (1–2), 15–25

H<sub>2</sub>-selective Pd membranes (1) were fabricated with microsystem technology. Permeation experiments were carried out over 623–873 K at H<sub>2</sub> feed partial pressures of 0.2–1.0 bar. At 823 K, a permeance based on the free membrane area of 18 mol H<sub>2</sub>/m<sup>2</sup> s bar<sup>0.58</sup> was measured for (1) (thickness 0.5 μm). (1) were stable for a rather long period; however, SEM analysis showed the formation of a grain-structured surface. At 873 K the H<sub>2</sub>/He selectivity of (1) decreases rapidly, caused by the formation of holes.

### Quartz Crystal Microbalance Sensor Based on Nanostructured IrO<sub>2</sub>

T. W. CHAO, C. J. LIU, A. H. HSIEH, H. M. CHANG, Y. S. HUANG and D. S. TSAI, *Sens. Actuators B: Chem.*, 2007, 122, (1), 95–100

Nanostructured IrO<sub>2</sub> crystals (1) were grown on a Au-coated quartz substrate by MOCVD, and their gas sensing properties studied by the quartz crystal microbalance (QCM) technique. Propionic acid adsorbed and desorbed reversibly on the IrO<sub>2</sub> surface at room temperature. (1) with nanoblade and layered-column morphologies showed higher sensitivities than (1) with incomplete-nanotube and square-nanorod morphologies. An IrO<sub>2</sub> QCM sensor was sensitive to ppm-level propionic acid vapour.

### Characterization of a Glucose Sensor Prepared by Electropolymerization of Pyrroles Containing a Tris-bipyridine Osmium Complex

M. TSUJIMOTO, T. YABUTANI, A. SANO, Y. TANI, H. MUROTANI, Y. MISHIMA, K. MARUYAMA, M. YASUZAWA and J. MOTONAKA, *Anal. Sci.*, 2007, 23, (1), 59–63

A glucose sensor (1) was obtained by electrocopolymerisation using pyrroles containing a tris-bipyridine (bpy) Os complex, pyrrole (py), pyrrole propanoic acid (PPA) and glucose oxidase (GOx). Tris-bipyridine Os pyrrole complexes (Os-py) with different methylene moieties were evaluated. The electrocatalytic response of glucose was observed at electrodes modified with Os-py, except for the one immobilised with Os-py containing the shortest methylene moiety. The electrocatalytic response to glucose of (1) with  $[\text{Os}(\text{bpy})_2(\text{py}(6)\text{-bpy})]^{2+/3+}$  was stable for > 100 days.

## HETEROGENEOUS CATALYSIS

### Comparison of Two Palladium Catalysts on Different Supports during Hydrogenation

M. CIZMECI, A. MUSAVI, A. TEKIN and M. KAYAHAN, *J. Am. Oil Chem. Soc.*, 2006, 83, (12), 1063–1068

Soybean oil was hydrogenated using 5% Pd/C and 10% Pd/Al<sub>2</sub>O<sub>3</sub>, at various ratios in a reactor (at 165°C, 2 bar H<sub>2</sub> and 500 rpm stirring rate). Reaction rate, *trans* isomer formation, selectivity ratios and melting behaviours were monitored. The activity of Pd/C was ~ 10 times higher than that of Pd/Al<sub>2</sub>O<sub>3</sub>.

### Molecular Level Dispersed Pd Clusters in the Carbon Walls of Ordered Mesoporous Carbon as a Highly Selective Alcohol Oxidation Catalyst

A.-H. LU, W.-C. LI, Z. HOU and F. SCHÜTH, *Chem. Commun.*, 2007, (10), 1038–1040

Pd/ordered mesoporous C (1), where temperature stable Pd clusters (< 1 nm) are uniformly embedded in the C walls, can be synthesised by a nanocasting route. The activity of (1) was tested in the oxidation of alcohols (benzyl alcohol, 1-phenylethanol, cinnamyl alcohol) using sc-CO<sub>2</sub> as the reaction medium. The selectivity to the corresponding aldehyde was > 99%. (1) are are stable and reusable.

### The Fabrication of Reactive Hollow Polysiloxane Capsules and Their Application as a Recyclable Heterogeneous Catalyst for the Heck Reaction

H. WANG, X. ZHENG, P. CHEN and X. ZHENG, *J. Mater. Chem.*, 2006, 16, (48), 4701–4705

4-(Triethoxysilyl)butyronitrile and dimethyldimethoxysilane monomers were consecutively cocondensed onto a microemulsion of preformed polydimethylsiloxane. The templated polydimethylsiloxane was removed by exposure to solvents. The above product is then reacted with Pd(OAc)<sub>2</sub> in anhydrous toluene and reduced with KBH<sub>4</sub> in EtOH to produce the hollow polysiloxane capsule-supported Pd complex (1). (1) is highly active and stereoselective for the Heck arylation of alkenes. (1) can be retrieved and reused.

### FT-IR Study on CO Hydrogenation to C<sub>2</sub>-Oxygenates over Rh-Based Catalyst

W. CHEN, Y. DING, D. JIANG, L. YAN, T. WANG, H. ZHU and H. LUO, *Chin. J. Catal.*, 2006, 27, (12), 1059–1062

Evolved species from Rh-Mn-Li-Ti/SiO<sub>2</sub> (1) during CO hydrogenation were investigated using *in situ* FT-IR spectroscopy. High pressure favoured the adsorption and activation of CO; high temperature favoured the dissociation of adsorbed CO. High pressure and high temperature promoted CO adsorption on (1) and allowed CO dissociation. Enhanced CO insertion activity produced good performance for C<sub>2</sub>-oxygenate formation.

### Effect of Ru Nanoparticle Size on Hydrogenation of Soybean Oil

B. XU, K. Y. LIEW and J. LI, *J. Am. Oil Chem. Soc.*, 2007, 84, (2), 117–122

Ru nanoparticles were used as catalysts (1) for the selective hydrogenation of soybean oil at 353 K and initial pressure of 1.5 MPa. PVP-Ru-MeOH with mean size of 3.10 nm, which had the highest activity, produced the lowest *cis* isomer content, only 30.6% *cis* isomers remained. (1) with larger mean sizes of 9.06 and 17.22 nm, which have lower activity, produced less *trans* isomer: 49 and 46%, respectively. However, (1) with the smallest size but the lowest hydrogenation activity, Ru-MeOH with mean size of 1.13 nm, was more active for the isomerisation.

## HOMOGENEOUS CATALYSIS

### Promoting Role of [PtI<sub>2</sub>(CO)]<sub>2</sub> in the Iridium-Catalyzed Methanol Carbonylation to Acetic Acid and Its Interaction with Involved Iridium Species

S. GAUTRON, N. LASSAUQUE, C. LE BERRE, L. AZAM, R. GIORDANO, P. SERP, G. LAURENCZY, J.-C. DARAN, C. DUHAYON, D. THIÉBAUT and P. KALCK, *Organometallics*, 2006, 25, (25), 5894–5905

The catalytic activity of the Ir complexes involved in MeOH carbonylation is enhanced when [PtI<sub>2</sub>(CO)]<sub>2</sub> (1) is added. Under CO (1) readily gives [PtI<sub>2</sub>(CO)<sub>2</sub>]. The turnover frequency value, which is 1450 h<sup>-1</sup> for Ir alone, reaches 2400 h<sup>-1</sup> for a Pt/Ir = 3/7 molar ratio, under 30 bar of CO and at 190°C. A catalytic cycle is proposed, which includes the cooperative effect between the Pt promoter and the Ir catalyst.

### Catalysis by Ir(III), Rh(III) and Pd(II) Metal Ions in the Oxidation of Organic Compounds with H<sub>2</sub>O<sub>2</sub>

P. K. TANDON, GAYATRI, S. SAHGAL, M. SRIVASTAVA and S. B. SINGH, *Appl. Organomet. Chem.*, 2007, 21, (3), 135–138

PdCl<sub>2</sub>, RhCl<sub>3</sub> and IrCl<sub>3</sub> were used in the oxidation of benzaldehydes (unsubstituted, *p*-chloro, *p*-nitro, *m*-nitro, *p*-methoxy) and cinnamaldehyde; anthracene and phenanthrene; cyclohexanol and benzyl alcohol by 50% H<sub>2</sub>O<sub>2</sub>. Traces of the chlorides catalyse these oxidations, resulting in good to excellent yields. PdCl<sub>2</sub> is the most efficient catalyst. Oxidation in aromatic aldehydes is selective at the aldehyde group only.

### Asymmetric Transfer Hydrogenation of Ketones and Imines with Novel Water-Soluble Chiral Diamine as Ligand in Neat Water

L. LI, J. WU, F. WANG, J. LIAO, H. ZHANG, C. LIAN, J. ZHU and J. DENG, *Green Chem.*, 2007, 9, (1), 23–25

A H<sub>2</sub>O-soluble Rh(III) catalyst (1) was prepared from *o,o'*-aminated *N*-tosyl-1,2-diphenylethylenediamine and [Cp\*RhCl<sub>2</sub>]<sub>2</sub>. (1) was efficient for the catalytic asymmetric transfer hydrogenation (ATH) of ketones and imines with sodium formate as H donor in neat H<sub>2</sub>O. (1) can catalyse the ATH of  $\alpha$ -bromomethylaromatic ketones and imines besides simple ketones. High yields and enantioselectivities can be achieved within a few hours at 28°C.

### Stability of the First-Generation Grubbs Metathesis Catalyst in a Continuous Flow Reactor

Z. LYSSENKO, B. R. MAUGHON, T. MOKHTAR-ZADEH and M. L. TULCHINSKY, *J. Organomet. Chem.*, 2006, 691, (24–25), 5197–5203

Ethylene pretreatment of (PCy<sub>3</sub>)<sub>2</sub>Cl<sub>2</sub>Ru=CHPh (1) prior to cross-metathesis of ethylene and *cis*-2-butene to form propylene in a continuous flow reactor (CFR) produced a direct effect on catalyst deactivation. Similar pretreatment of (1) with *cis*-2-butene caused far less change in the catalyst activity. Continuous removal of products in the CFR was important for separating the effects of catalyst decay and catalyst deactivation caused by the terminal olefin, propylene.

## FUEL CELLS

### Deposited RuO<sub>2</sub>-IrO<sub>2</sub>/Pt Electrocatalyst for the Regenerative Fuel Cell

Y. ZHANG, C. WANG, N. WAN and Z. MAO, *Int. J. Hydrogen Energy*, 2007, 32, (3), 400–404

RuO<sub>2</sub>-IrO<sub>2</sub>/Pt (1) was prepared by even deposition of Ir hydroxide hydrate and Ru hydroxide hydrate on Pt black and calcination in air. The RuO<sub>2</sub>-IrO<sub>2</sub> was well dispersed and deposited on the surface of Pt black. URFC with deposited (1) showed better performance than that of URFC with mixed (1) catalyst. Cyclic performance of the URFC with deposited (1) was very stable during 10 cyclic tests.

### Pt-Ir-IrO<sub>2</sub>NT Thin-Wall Electrocatalysts Derived from IrO<sub>2</sub> Nanotubes and Their Catalytic Activities in Methanol Oxidation

C.-C. SHAN, D.-S. TSAI, Y.-S. HUANG, S.-H. JIAN and C.-L. CHENG, *Chem. Mater.*, 2007, 19, (3), 424–431

Lattice O of IrO<sub>2</sub> nanotubes (IrO<sub>2</sub>NT) was removed under high-vacuum thermal annealing to facilitate nucleation of 3–5 nm Ir grains and subsequent synthesis of PtIr catalyst on the tube walls. The amount of Ir being reduced, the Ir grain size, and the deposited Pt size influence the surface area and the catalytic activity. Pt-Ir-IrO<sub>2</sub>NT reduced at 500°C exhibited higher activity than Pt-IrO<sub>2</sub>NT and Pt-IrNT in MeOH oxidation, and also a higher current density than that of PtRu in the high potential region.

### Fast Preparation of PtRu Catalysts Supported on Carbon Nanofibers by the Microwave-Polyol Method and Their Application to Fuel Cells

M. TSUJI, M. KUBOKAWA, R. YANO, N. MIYAMAE, T. TSUJI, M.-S. JUN, S. HONG, S. LIM, S.-H. YOON and I. MOCHIDA, *Langmuir*, 2007, 23, (2), 387–390

PtRu alloy nanoparticles (24 ± 1 wt.%, Ru/Pt atomic ratios = 0.91–0.97) supported on C nanofibres (CNFs) were prepared by a microwave-polyol method. The DMFC activities of PtRu/CNF catalysts were: platelet > tubular > herringbone. The DMFC activities of PtRu/CNFs measured at 60°C were higher than for standard PtRu (29 wt.%, Ru/Pt atomic ratio = 0.92) catalyst loaded on C black (Vulcan XC72R).

### The Effect of Heat Treatment on Nanoparticle Size and ORR Activity for Carbon-Supported Pd-Co Alloy Electrocatalysts

L. ZHANG, K. LEE and J. ZHANG, *Electrochim. Acta*, 2007, 52, (9), 3088–3094

An impregnation method was used for the synthesis of Pd-Co/C (1), in which NaBH<sub>4</sub> was the reducing agent. (1) heat-treated at 300°C had average particle size of 8.9 nm, and the highest ORR catalytic activity. Electrocatalytic ORR activity was also examined in an acidic solution containing MeOH. (1) has MeOH tolerant capabilities.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Heterostructured Magnetic Nanoparticles: Their Versatility and High Performance Capabilities

Y. JUN, J. CHOI and J. CHEON, *Chem. Commun.*, 2007, (12), 1203–1214

The recent advances in the development of magnetic nanoparticles (such as FePt, CoPt<sub>3</sub>) are reviewed, with a focus on multicomponent heterostructured nanoparticles including alloys, core–shells, and binary superlattices synthesised *via* nonhydrolytic methods. Their multifunctionality and high performance capabilities are demonstrated for applications in high density magnetic storage, catalysis, and biomedical separation and diagnostics. (94 Refs.)

### Lithography-Free in Situ Pd Contacts to Templated Single-Walled Carbon Nanotubes

M. R. MASCHMANN, A. D. FRANKLIN, A. SCOTT, D. B. JANES, T. D. SANDS and T. S. FISHER, *Nano Lett.*, 2006, 6, (12), 2712–2717

C SWNTs were synthesised from an embedded Fe catalyst in a modified porous anodic alumina (PAA) template (1). Pd is electrodeposited into (1) to form nanowires. Individual vertical channels of C SWNTs are created, each with a vertical Pd nanowire back contact. Further Pd deposition resulted in annular Pd nanoclusters that form on portions of C SWNTs extending onto the PAA surface. Two-terminal electrical characteristics produce linear *I*–*V* relationships, indicating ohmic contact in the devices.