New Application Developments in PGMs – June 2009

Toshiba Corporation to present "Confinement of Triplet-Excited States by Fluorinated Polyvinylcarbazole for High Efficiency OLEDs" at SID 2009 Display Week: Iridium
News and Media Center - Toshiba America Electronic Components & Semiconductors, 2 June, 2009

http://www.toshiba.com/taec/news/press_releases/2009/lcdb_09_565.jsp

Toshiba America Electronic Components, Inc. (TAEC),* announced that Toshiba Mobile Display Co., Ltd. (TMD)** and Toshiba Corporation R&D representatives will present six papers addressing next-generation display technologies at the Society for Information Display (SID) Symposium, Seminar and Exhibition, on Wednesday and Thursday, June 3 and 4 at the Henry B. Gonzalez Convention Center in San Antonio, Texas.

SID 2009 Display Week, http://www.sid.org/conf/sid2009/sid2009.html

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MIT makes 36nm lines with "interference" litho step:Palladium
Solid State Technology, June 2009

http://www.solid-state.com/display_article/363947/5/none/none/Dept/MIT-makes-36nm-lines-with-%E2%80%9Cinterference%E2%80%9D-litho-ste

A team of researchers at MIT have produced 36nm-wide lines using interference patterns and a photochromic material, and say the technique could be extended down to patterns on the scale of individual molecules.

Their setup consisted of: a silicon substrate spin-coated with 200nm of anti-reflection coating (ARC), 200nm of photoresist, an 8nm-thick PVA barrier layer, and 410nm of the photochromic layer. Following exposure, removal of the PVA and photochromic layers, and baking (120°C for 90sec) and developing (TMAH for 60sec), the patterns were spin-coated with 2nm of palladium/gold alloy and inspected in a SEM. Average linewidth was seen to be about 36nm, roughly a tenth of the originating 325nm wavelength light, and also were spaced by 350nm, to the period of the second wavelength (633nm).

Nanocrystal growth process revealed: Platinum
Chemistry World, 04 June 2009

http://www.rsc.org/chemistryworld/News/2009/June/04060903.asp

Research by US scientists has shed light on precisely how nanocrystals grow, providing key information that could help improve fuel cells of the future.

The team, led by Ulrich Dahmen of Lawrence Berkeley National Laboratory and Paul Alivisatos of the University of California, Berkeley, studied the behaviour of single platinum nanoparticles in solution.

They used transmission electron microscopy (TEM) with a liquid cell, which allows liquids to be observed inside a vacuum.

Phosphorescent Complexes Improve Manufacturing of High-Efficiency Light Sources: Iridium
AZoNano, 04 June 2009

http://www.azonano.com/news.asp?newsID=11900

Organic light-emitting diodes (OLEDs) are set to revolutionize lighting technology, ushering in an era of thin, flexible, and ultra-bright devices. At the heart of recent OLED devices are phosphorescent metal complexes that, when stimulated by an electric voltage, produce a sustained emission of light with higher efficiency than other sources. Furthermore, because OLEDs create their own light, they eliminate the need for backlights used in liquid crystal displays, and therefore consume low amounts of power.

A phosphorescent iridium–amidinate complex (top left) serves as an excellent emitter (bottom), enabling the first successful fabrication of highly efficient non-doped phosphorescent OLEDs (top right).

Observation of Single Colloidal Platinum Nanocrystal Growth Trajectories: Platinum
Science, 05 June 2009

http://www.sciencemag.org/cgi/content/abstract/324/5932/1309

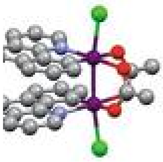
Understanding of colloidal nanocrystal growth mechanisms is essential for the syntheses of nanocrystals with desired physical properties. The classical model for the growth of monodisperse nanocrystals assumes a discrete nucleation stage followed by growth via monomer attachment, but has overlooked particle-particle interactions. Recent studies have suggested that interactions between particles play an important role. Using in situ transmission electron microscopy, we show that platinum nanocrystals can grow either by monomer attachment from solution or by particle coalescence. Through the combination of these two processes, an initially broad size distribution can spontaneously narrow into a nearly monodisperse distribution. We suggest that colloidal nanocrystals take different pathways of growth based on their size- and morphology-dependent internal energies.

Vol. 324. no. 5932, pp. 1309 - 1312

Pd(III) catalysis insight: Palladium
Chemistry World, 07 June 2009

http://www.rsc.org/chemistryworld/News/2009/June/05060903.asp

The discovery of a bimetallic palladium(III) complex that can catalyse formation of carbon-heteroatom bonds adds a new facet to our understanding of the chemistry of one of the most widely-used metals in catalysis, say US chemists.



Palladium(III) debut

Latest News | Chemical & Engineering News, June 8, 2009, Volume 87, Number 23, p. 10

http://pubs.acs.org/cen/news/87/i23/8723notw7.html

Sustainable syntheses: Ruthenium
Cover | *Chemical & Engineering News*, 08 June 2009

http://pubs.acs.org/cen/coverstory/87/8723cover.html

Boehringer Ingelheim

RCM Macrocyclization Made Practical: An Efficient Synthesis of HCV Protease Inhibitor BILN 2061

http://pubs.acs.org/doi/abs/10.1021/ol800183x

Second-Generation Process for the HCV Protease Inhibitor BILN 2061: A Greener Approach to Ru-Catalyzed Ring-Closing Metathesis

http://pubs.acs.org/doi/abs/10.1021/op800225f

Volume 87, Number 23, pp. 13-22

Bilayer graphene gets a bandgap: Platinum
Eurek-Alert!, 10 June 2009

http://www.eurekalert.org/pub_releases/2009-06/dbnl-bgg060809.php

Image: http://www.eurekalert.org/multimedia/pub/14510.php?from=138479

Feng Wang and colleagues have engineered a bandgap in bilayer graphene that can be precisely controlled from 0 to 250 milli-electron volts (250 meV, or .25 eV).

The device was a dual-gated field-effect transistor (FET), a type of transistor that controls the flow of electrons from a source to a drain with electric fields shaped by the gate electrodes. Their nano-FET used a silicon substrate as the bottom gate, with a thin insulating layer of silicon dioxide between it and the stacked graphene layers. A transparent layer of aluminum oxide (sapphire) lay over the graphene bilayer; on top of that was the top gate, made of platinum.

Magnetic sensors attract attention: Platinum
Riken research, 12 June 2009

http://www.rikenresearch.riken.jp/research/726/

Chemical-induced switching of polymer magnetism achieved at room temperature.

An international team of researchers has developed a route to detect adsorption through reversible chemo-switching of the magnetic properties of a porous coordination polymer.

In the team's polymer, iron and platinum atoms are joined into a regular cubic framework through a cyclic carbon–nitrogen molecule called pyrazine and cyanide connection units. The spin state of the ironatoms—the number of unpaired electrons that determine magnetism—is dependent upon their proximity to the organic connectors.

"These porous coordination polymers combine properties such as gas adsorption and storage with the physical properties incorporated in their frameworks."

"They can be processed into nanoscale particles or films for applications such as chemical sensors and molecular memories."

$1.2 Million for Pall Corporation Carbon Capture:Palladium alloys for use in membranes
Kirsten Gillibrand - United States Senator for New York: News, June 11, 2009

http://gillibrand.senate.gov/newsroom/press/release/?id=c1abe60e-56ce-450a-808f-718bf01e6ba9

Schumer, Gillibrand Announce $1.2 Million for Pall Corporation Carbon Capture

Funding Will Help Fund Green Energy Technologies to Reduce Carbon Dioxide Emission

The Pall Corporation, a filter company that solves complex contamination, separations, purification and detection problems will use the $1.2 million in funding to leverage its proprietary membrane fabrication technology to screen a large number of palladium (Pd)-alloys for use in membranes for separating hydrogen from synthesis gas mixtures.

Chemical directors: Palladium
NMR Knowledge Base, 15 June 2009

http://www.spectroscopynow.com/coi/cda/detail.cda?id=21763&type=Feature&chId=5&page=1

John Brown, of the University of Oxford, UK, and his colleagues Waqar Rauf and Amber Thompson, have taken a close look at the underpinnings of regioselectivity. They focused on the formation of synthetically important palladacycle intermediates using NMR spectroscopy and X-ray structure determination. As such, they have gained new insights that could offer a "more complete picture" with which synthetic chemists can work to unravel the complexities of regioselectivity. Brown explains that "too much catalytic chemistry is based on empirical approaches, and we need more predictive power so that rational approaches have more value."

Caltech scientists use high-pressure "alchemy" to createnonexpanding metals: Palladium
Press Releases - Caltech, 15 June 2009

http://media.caltech.edu/press_releases/13269

By squeezing a typical metal alloy at pressures hundreds of thousands of times greater than normal atmospheric pressure, scientists at the California Institute of Technology (Caltech) have created a material that does not expand when heated, as does nearly every normal metal, and acts like a metal with an entirely different chemical composition.

Pressure-Induced Invar Behavior in Pd_3Fe

Phys. Rev. Lett., 2009

http://link.aps.org/doi/10.1103/PhysRevLett.102.237202

Novel light-sensitive compounds show promise for cancer therapy: Ruthenium
UC Santa Cruz - Press Releases, 16 June 2009

http://www.ucsc.edu/news_events/press_releases/text.asp?pid=3034

Chemists at the University of California, Santa Cruz, have developed novel compounds that show promise for photodynamic cancer therapy, which uses light-activated drugs to kill tumor cells.

The new compounds, called dye-sensitized ruthenium nitrosyls, are absorbed by cancer cells and respond to specific wavelengths of light by releasing nitric oxide, which triggers cell death.

Phototriggered fuel production: Ruthenium
Chemical Technology, 19 June 2009

http://www.rsc.org/Publishing/ChemTech/Volume/2009/08/phototriggered_fuel_production.asp

Matthias Beller and colleagues at the University of Rostock used a ruthenium catalyst to break down formic acid into hydrogen, which can be used to power a fuel cell, and carbon dioxide. They found that shining a light on the reaction mixture increased the reaction rate, meaning they could turn hydrogen production on or off by controlling the light source.

Hydrogen generation: catalytic acceleration and control by light

Chem. Commun., 2009

http://dx.doi.org/10.1039/b908121f

Image: http://www.rsc.org/ej/CC/2009/b908121f/b908121f-s1.gif

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Increase in palladium-carbon contacts destabilizeshydrogen: Palladium
nanotechweb.org, Jun 25, 2009

http://nanotechweb.org/cws/article/lab/39582

Researchers at Oak Ridge National Laboratory in the US are investigating the mechanism by which small amounts of palladium nanoparticles (3–5 nm) embedded into high-surface-area nanoporous carbons enhance room-temperature hydrogen adsorption capacity by nearly 30% compared with the equivalent carbon without the palladium particles.

Super fast film recording makes ultra precise chemistry possible: Platinum
Insciences, 26 June 2009

http://insciences.org/article.php?article_id=5913

A Danish research group are the first to film the formation of a new molecule out of two separate chemical substances.

The group from the Centre for Molecular Movies created a photoactive platinum molecule in the laboratory at the Department of Chemistry in Copenhagen. By activating the platinum molecule with laser light it is able to bind ions of the metal thallium and when these two substances meet in a liquid solution they form a completely new molecule. After a few microseconds the new molecule breaks up into two parts which are then ready to react again. According to Morten Christensen, it is completely new, being able to control a reaction that can go both ways and being able to follow the structural changes in the process live at the same time.

The film recordings are made at the kilometres long European Synchroton Radiation Facility (ESRF) in Grenoble, which is one of the three places in the world where you can make the most powerful X-ray beams.

Control noble metal nanoparticle loading on titania: Platinum, ruthenium
Noteworthy Chemistry, 29 June, 2009

http://portal.acs.org/portal/PublicWebSite/noteworthy/archive/CNBP_022175

Metal–TiO_2 composites are used in applications from photochemistry to heterogeneous catalysis.

Z. Liu and co-workers at the Chinese Academy of Sciences (Beijing) report a novel, simple, clean way to grow noble metal (e.g., platinum, ruthenium) nanoparticles directly by using an in situ redox reaction between the reductive titanium support and aqueous solutions of metal salt precursors.

For more scientific research papers on platinum group metals go to: www.platinummetalsreview.com