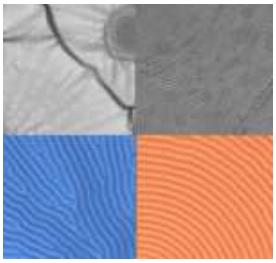
Hot Topics

WILEY-VCH

ADVANCED MATERIALS | NANO MICRO small | CHEMPHYSCHEM | Macromolecular Rapid Communications

Surfaces and Interfaces



Interfaces and surfaces are where the action happens. Catalysis, molecular recognition, charge transfer, polymerization and many other critical processes take place at the boundary between one medium and another. With the need to integrate new materials into devices, and applications ranging from catalysis to sensors, medicine to self-cleaning surfaces, and displays to lasers, fundamental and applied studies of surface and interface processes and optimization are of critical importance in developing new technology to meet today's challenges. The selection of recent research articles presented below illustrates the vast potential of this field.

For recent reviews, see

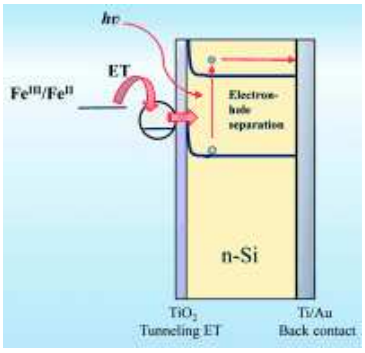
- F. Xia, L. Jiang
  Bio-Inspired, Smart, Multiscale Interfacial Materials
- J. Xu et al.
  Facile Creation of Biomimetic Systems at the Interface and in Bulk
- G. Ertl
  Reactions at Surfaces: From Atoms to Complexity (Nobel Lecture)

RSS feed

Recent Articles

Hyun S. Ahn, Allen J. Bard

Single-Nanoparticle Collision Events: Tunneling Electron Transfer on a Titanium Dioxide Passivated n-Silicon Electrode [Communication]



Collision course: Single-nanoparticle collisions result in tunneling electron transfer (ET) from platinum nanoparticles through a thin insulating oxide layer to an n-type silicon electrode (see figure). Single-nanoparticle collisions can be observed on large electrodes (d>100 μm), and this technique avoids photocorrosion and current decay that are experienced with unprotected n-Si surfaces.

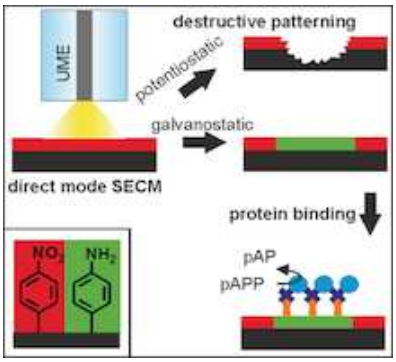
Angew. Chem. Int. Ed., September 17, 2015, DOI: 10.1002/anie.201506963

Lutz Stratmann, Jan Clausmeyer, Wolfgang Schuhmann

Non-destructive Patterning of Carbon Electrodes by using the Direct Mode of Scanning Electrochemical Microscopy [Article]

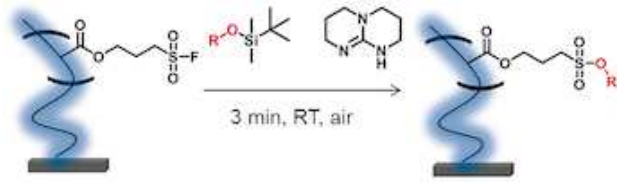
Chemical writing: Nitrophenyl groups grafted onto glassy carbon were locally reduced to amino groups by galvanostatic pulsing in the direct mode of scanning electrochemical microscopy (SECM). By using pH-modulated SECM imaging, the identity of the amino groups was unambiguously discriminated against corroded carbon resulting from destructive patterning. The amino functionalities were used for the generation of bioarrays by local protein immobilization.

ChemPhysChem, September 11, 2015, DOI: 10.1002/cphc.201500585



Jeremy Yatvin, Karson Brooks, Jason Locklin

SuFEx on the Surface: A Flexible Platform for Postpolymerization Modification of Polymer Brushes [Communication]

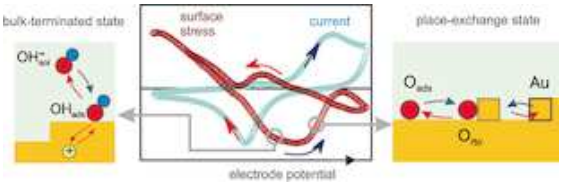


Sulfur(VI) fluoride exchange (SuFEx) is used to "click" a silyl ether rapidly and quantitatively to a polymer brush containing native SO_2F groups. SuFEx is further demonstrated to facilely add a variety of other functional groups to brush substrates, including alkynes, thiols, and dienes.

Angew. Chem. Int. Ed., September 9, 2015, DOI: 10.1002/anie.201506253

Qibo Deng, Varun Gopal, Jörg Weissmüller

Less Noble or More Noble: How Strain Affects the Binding of Oxygen on Gold [Communication]

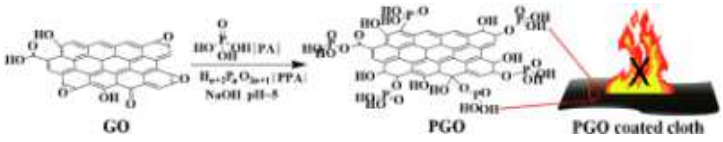


Less noble or more noble?: The different oxygen electrosorption processes, and specifically oxygen species adsorption on the bulk-terminated surface versus the formation of a mixed oxygen–gold surface layer by the replacement-turnover process, exhibit fundamentally different coupling between the chemistry and the mechanics of the surface.

Angew. Chem. Int. Ed., September 9, 2015, DOI: 10.1002/anie.201504715

Surajit Some, Iman Shackery, Sun Jun Kim, Seong Chan Jun

Phosphorus-Doped Graphene Oxide Layer as a Highly Efficient Flame Retardant [Communication]



Putting out fires: Phosphorus-doped graphene oxide (PGO) is prepared by the treatment of polyphosphoric acid with phosphoric acid followed by addition of a graphene oxide solution while maintaining the pH at around 5 by addition of NaOH solution. The as-made PGO solution-coated cloth exhibits excellent flame retardation properties.

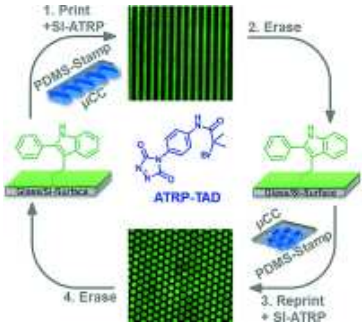
Chem. Eur. J., September 8, 2015, DOI: 10.1002/chem.201502170

Oliver Roling, Kevin De Bruycker, Benjamin Vonhören, Lucas Stricker, Martin Körsgen, Heinrich F. Arlinghaus, Bart Jan Ravoo, Filip E. Du Prez

Rewritable Polymer Brush Micropatterns Grafted by Triazolinedione Click Chemistry [Communication]

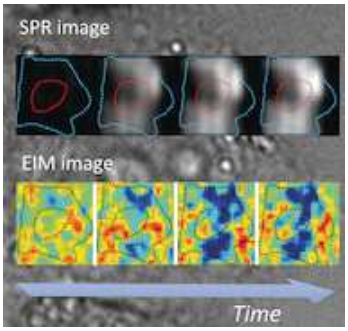
Write and erase: The click reaction between a triazolinedione (TAD)-conjugated ATRP initiator and indole was used for the patterning of glass and silicon wafers employing microcontact chemistry. The reversibility of the click reaction enabled the writing, erasing, and rewriting of surfaces with polymer brush micropatterns for the first time.

Angew. Chem. Int. Ed., September 8, 2015, DOI: 10.1002/anie.201506361



Jin Lu, Jinghong Li

Label-Free Imaging of Dynamic and Transient Calcium Signaling in Single Cells [Communication]

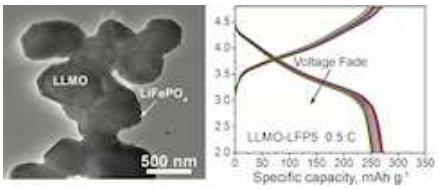


A plasmonic-based electrochemical impedance microscope with excellent temporal and subcellular resolution was developed for studying cell-signaling processes. The calcium signaling activities at the early stage of GPCR (G-protein-coupled receptor) stimulation could thus be elucidated.

Angew. Chem. Int. Ed., September 4, 2015, DOI: 10.1002/anie.201505991

Fenghua Zheng, Chenghao Yang, Xunhui Xiong, Jiawen Xiong, Renzong Hu, Yu Chen, Meilin Liu

Nanoscale Surface Modification of Lithium-Rich Layered-Oxide Composite Cathodes for Suppressing Voltage Fade [Communication]

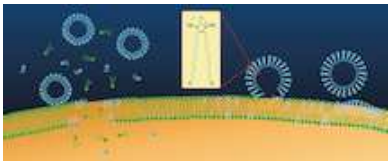


Lithium-rich layered oxides, $Li_{1.2}Mn_{0.54}Ni_{0.13}Co_{0.13}O_2$ (LLMO), were modified with a nanoscale $LiFePO_4$ (LFP) surface according to a facile sol–gel method. This surface modification combines the advantages of bulk doping and surface coating as the LLMO crystal structure is stabilized by cationic doping and the LLMO cathode is protected from corrosion processes induced by organic electrolytes.

Angew. Chem. Int. Ed., September 3, 2015, DOI: 10.1002/anie.201506408

Da Wang, Christian Richter, Andreas Rühling, Patrick Drücker, Daniel Siegmund, Nils Metzler-Nolte, Frank Glorius, Hans-Joachim Galla

A Remarkably Simple Class of Imidazolium-Based Lipids and Their Biological Properties [Communication]



Lipids! A series of imidazolium salts bearing two alkyl chains in the backbone were synthesized, resembling the structure of lipids. The biological activity resulting from their surface activity and membrane interaction are shown (see figure), which were determined by the alkyl chain length.

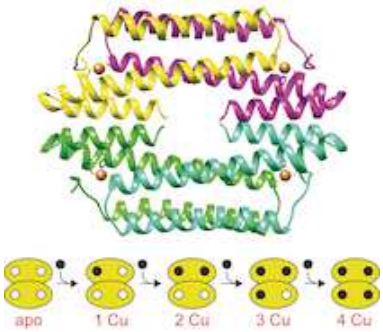
Chem. Eur. J., September 2, 2015, DOI: 10.1002/chem.201502333

Alexander D. Jacobs, Feng-Ming James Chang, Lindsay Morrison, Jonathan M. Dilger, Vicki H. Wysocki, David E. Clemmer, David P. Giedroc

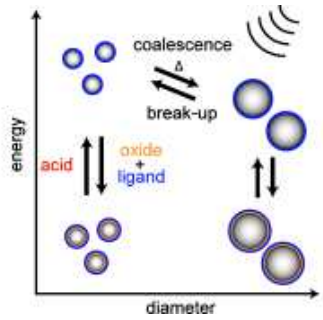
Resolution of Stepwise Cooperativities of Copper Binding by the Homotetrameric Copper-Sensitive Operon Repressor (CsoR): Impact on Structure and Stability [Communication]

Working together: The step-wise cooperativities of Cu binding to the homotetrameric copper-sensitive operon repressor (CsoR) were resolved by mass spectrometry, with the extent of cooperativity related to gas phase properties. The gas phase holo (Cu_4) structure was found to favor a more compact state, and was markedly more resistant to fragmentation than apo- or partially Cu-ligated species.

Angew. Chem. Int. Ed., September 2, 2015, DOI: 10.1002/anie.201506349



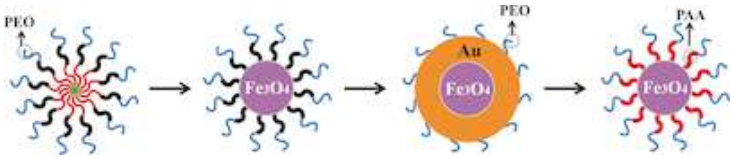
Akihisa Yamaguchi, Yu Mashima, Tomokazu Iyoda
Reversible Size Control of Liquid-Metal Nanoparticles under Ultrasonication [Communication]



An ultrasonication method for reversibly changing the size of gallium nanoparticles (GaNPs) has been developed. By changing the temperature or adding acid, the balance between the break-up and coalescence of the GaNPs can be adjusted by modulating the natural surface oxide layer and the stabilizing effect of a surfactant. Moreover, these GaNPs display size-dependent plasmonic absorption.

Angew. Chem. Int. Ed., August 31, 2015, DOI: 10.1002/anie.201506469

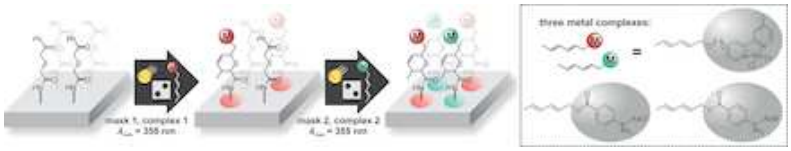
Di Yang, Xinchang Pang, Yanjie He, Yiquan Wang, Genxiang Chen, Wenzhong Wang, Zhiqun Lin
Precisely Size-Tunable Magnetic/Plasmonic Core/Shell Nanoparticles with Controlled Optical Properties [Communication]



Star-like amphiphilic triblock copolymers with narrow molecular weight distributions were synthesized by combining two sequential atom-transfer radical polymerizations with a click reaction. A family of uniform magnetic/plasmonic core/shell nanoparticles with precisely controllable core diameters and shell thicknesses were then obtained by capitalizing on these triblock copolymers as nanoreactors [PAA=poly(acrylic acid), PEO=poly(ethylene oxide)].

Angew. Chem. Int. Ed., August 31, 2015, DOI: 10.1002/anie.201504676

Christiane Lang, Sebastian Bestgen, Alexander Welle, Rouven Müller, Peter W. Roesky, Christopher Barner-Kowollik
Photolithographic Encoding of Metal Complexes [Communication]

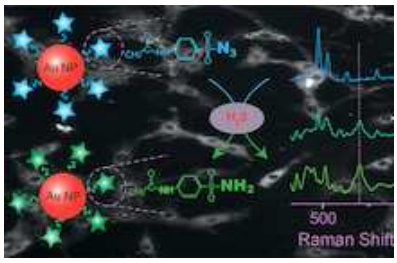


Metal-complex encoding was realized by the light-triggered activation of a self-assembled monolayer (SAM) of UV-labile anchors, that is, phenacylsulfides, and the subsequent cycloaddition of selected diene-functionalized metal complexes at defined areas on the surface. A detailed study of a short chain oligomer model system in solution confirms the high efficiency of the photoreaction.

Chem. Eur. J., August 28, 2015, DOI: 10.1002/chem.201502586

Da-Wei Li, Lu-Lu Qu, Kai Hu, Yi-Tao Long, He Tian
Monitoring of Endogenous Hydrogen Sulfide in Living Cells Using Surface-Enhanced Raman Scattering [Communication]

Rapid, selective, and sensitive: The endogenous H_2S in living cells can be detected rapidly, selectively, and sensitively using a surface-enhanced Raman scattering (SERS) nanosensor, 4-acetamidobenzenesulfonyl azide-functionalized gold nanoparticles (AuNPs/4-AA). Based on the rapid and specific reaction between H_2S and 4-AA, combined with the sensitive

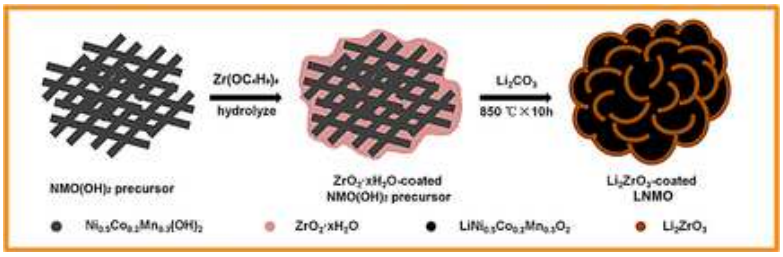


fingerprinting capability of SERS, the nanosensor can monitor the endogenous H_2S generated in a variety of pathophysiological pathways.

Angew. Chem. Int. Ed., August 28, 2015, DOI: 10.1002/anie.201505025

Hao Wu, Zongyi Wang, Shengjie Liu, Li Zhang, Yun Zhang

Fabrication of Li^+-Conductive Li_2ZrO_3-Based Shell Encapsulated $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ Microspheres as High-Rate and Long-Life Cathode Materials for Li-Ion Batteries [Article]

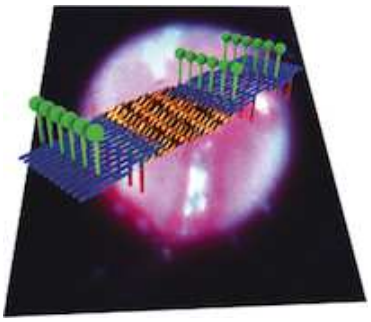


Shell shocked: Ternary layered $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ microspheres are functionally modified with fast-Li^+-conductive Li_2ZrO_3, and the surface-coated $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ microspheres exhibit remarkably improved electrochemical performances as cathode materials in both half and full cells.

ChemElectroChem, August 28, 2015, DOI: 10.1002/celc.201500303

Rebecca Meyer, Barbara Saccà, Christof M. Niemeyer

Site-Directed, On-Surface Assembly of DNA Nanostructures [Communication]

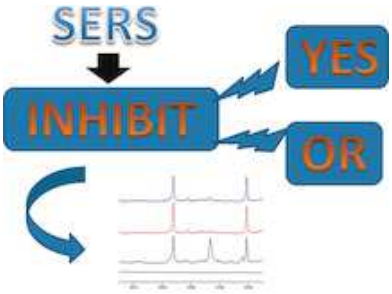


From micro to nano: Orthogonal topographic modification of planar DNA nanostructures combined with site-directed on-surface assembly provides a means to bridge top-down micropatterning with bottom-up nanotechnology.

Angew. Chem. Int. Ed., August 26, 2015, DOI: 10.1002/anie.201505553

Zitong Wu, Boran Dong, Xiaodong Zhou, Aiguo Shen, Jiming Hu

INHIBIT-Inspired Two-Output DNA Logic Gates Based on Surface-Enhanced Raman Scattering [Communication]



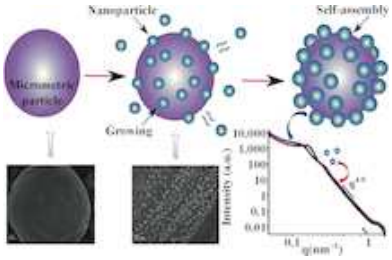
Readout by SERS: With the help of surface-enhanced Raman scattering, we can construct a logic gate operating two functions simultaneously inspired from INHIBIT logic gate. This strategy enables us to design a modular logic circuit.

Chem. Eur. J., August 20, 2015, DOI: 10.1002/chem.201502938

Yolice P. Moreno, Mateus B. Cardoso, Edwin A. Moncada, João H. Z. dos Santos

Correlating the Morphological Properties and Structural Organization of Monodisperse Spherical Silica Nanoparticles Grown on a Commercial Silica Surface [Article]

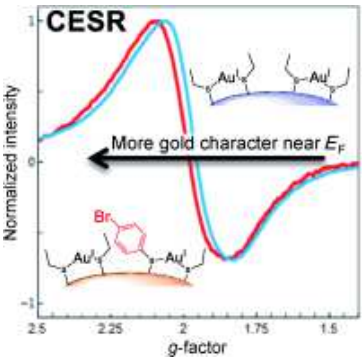
Mix and match: The growth and self-assembly of synthesized monodisperse silica nanospheres results in a hierarchical structure with surface heterogeneity between nano- and microsized synthesized silica particles. The effect of the concentration of tetraethoxysilane on the hierarchical and morphological structure is studied. Systems that combine nano- and microscale properties are studied by small-angle X-ray scattering.



ChemPhysChem, August 19, 2015, DOI: 10.1002/cphc.201500216

Anthony Cirri, Alexey Silakov, Benjamin J. Lear

Ligand Control over the Electronic Properties within the Metallic Core of Gold Nanoparticles [Communication]

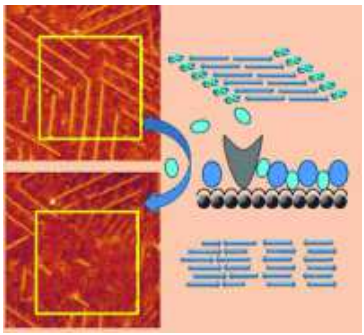


Good as gold: The surface chemistry of gold nanoparticles (AuNPs) is shown to influence the behavior of electrons within the metallic core. Conduction electron spin resonance (CESR) spectra and surface plasmon resonance bands for AuNPs are sensitive to ligand exchange of hexanethiol for 4-bromothiophenol on the surface of the NPs, demonstrating that the chemical nature of the ligand controls the valence band structure of AuNPs.

Angew. Chem. Int. Ed., August 14, 2015, DOI: 10.1002/anie.201505933

Yue Yu, Yanlian Yang, Chen Wang

Identification of Core Segment of Amyloidal Peptide Mediated by Chaperone Molecules by using Scanning Tunneling Microscopy [Article]

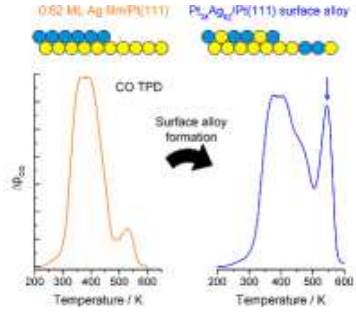


When chaperones are not at home: Direct in situ observation of the modulating effect of chaperone molecules can be achieved by perturbations from an STM tip, which can effectively remove the chaperone molecules and form pristine peptide assemblies. With chaperone molecules, peptides form ordered parallel β-sheet structures and a homogeneous distribution, which reveals the core segments of the peptide.

ChemPhysChem, August 13, 2015, DOI: 10.1002/cphc.201500340

Thomas Diemant, Konstantin M. Schüttler, R. Jürgen Behm

Ag on Pt(111): Changes in Electronic and CO Adsorption Properties upon PtAg/Pt(111) Monolayer Surface Alloy Formation [Article]



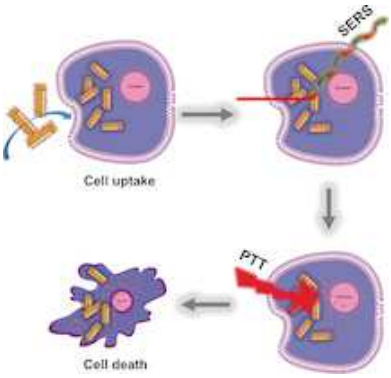
Bimetallic surfaces: When going from a separated (Ag film/Pt) to intermixed (surface alloy) morphology, the electronic and chemical properties of AgPt surfaces change profoundly. Most prominently, isolated Pt sites (small ensembles surrounded by Ag layer) are formed, on which CO binds more strongly (see picture).

ChemPhysChem, August 13, 2015, DOI: 10.1002/cphc.201500528

Lin Deng, Qiujin Li, Yang Yang, Haneen Omar, Naijun Tang, Jianfei Zhang, Zhihong Nie, Niveen M. Khashab

"Two-Step" Raman Imaging Technique To Guide Chemo-Photothermal Cancer Therapy [Full Paper]

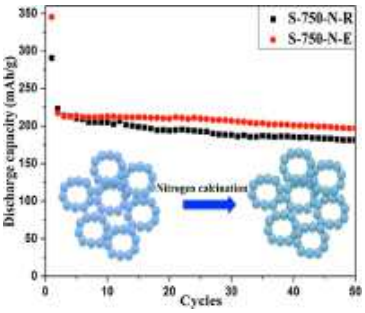
One step at a time: Surface-enhance Raman spectroscopy (SERS) is employed to guide chemo-photothermal cancer therapy through a two-step mechanism. This method affords real-time observation of drug release in vitro and in vivo to better understand the synergy between chemotherapy and photothermal therapy.



Chem. Eur. J., August 13, 2015, DOI: 10.1002/chem.201502522

Wei Zhang, Zhongyi Liu, Xingcheng Xiao, Dawei Liu

Synthesis of Nanoporous $Li_4Ti_5O_{12}$–TiO_2 Composites for High-Performance Lithium-Ion-Battery Anodes [Article]

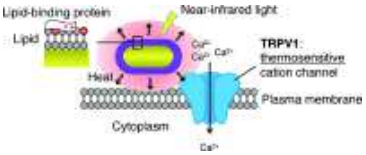


LIB it up: Homogeneous $Li_4Ti_5O_{12}$–TiO_2 nanoporous composites can be easily fabricated through a nitrogen calcination process. The prepared samples (S-750-N) exhibit high capacity as well as good cycling stability when tested both at room temperature and 55 °C, which provides a novel method for the synthesis of composites used in relevant fields.

ChemElectroChem, August 12, 2015, DOI: 10.1002/celc.201500299

Hirotaka Nakatsuji, Tomohiro Numata, Nobuhiro Morone, Shuji Kaneko, Yasuo Mori, Hiroshi Imahori, Tatsuya Murakami

Thermosensitive Ion Channel Activation in Single Neuronal Cells by Using Surface-Engineered Plasmonic Nanoparticles [Communication]

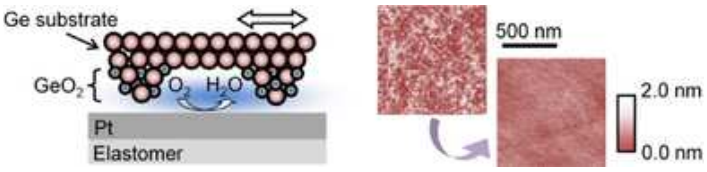


Hot membranes: A non-disruptive plasma membrane heating method employs gold nanorods (AuNRs) coated with a cationic protein/lipid complex. Under near-infrared illumination, these AuNRs induce highly localized photothermal heat generation in intact neuronal cells without membrane damage, enabling Ca^{2+} influx solely by activation of the thermosensitive cation channel TRPV1.

Angew. Chem. Int. Ed., August 6, 2015, DOI: 10.1002/anie.201505534

Tatsuya Kawase, Yusuke Saito, Atsushi Mura, Takeshi Okamoto, Kentaro Kawai, Yasuhisa Sano, Mizuho Morita, Kazuto Yamauchi, Kenta Arima

Catalyst-Assisted Electroless Flattening of Ge Surfaces in Dissolved-O_2-Containing Water [Communication]



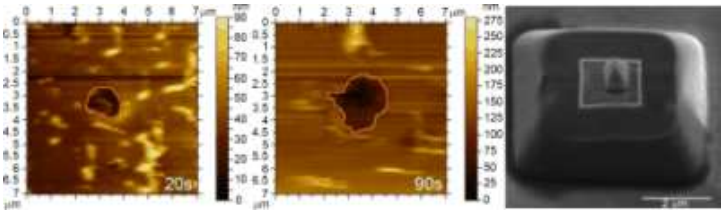
Smooth criminal: A Ge surface is flattened through the preferential oxidation of surface protrusions to form soluble GeO_2 on Ge. This is achieved by using a Pt film as a catalyst to enhance the oxygen reduction reaction in water. A schematic of this concept is shown in the picture (left), which improves the surface microroughness of Ge compared with that of an untreated surface, as also shown in the picture (right).

ChemElectroChem, July 23, 2015, DOI: 10.1002/celc.201500245

Javier Izquierdo, Alexander Eifert, Christine Kranz, Ricardo M. Souto

In Situ Monitoring of Pit Nucleation and Growth at an Iron Passive Oxide Layer by using Combined Atomic Force and Scanning Electrochemical Microscopy [Article]

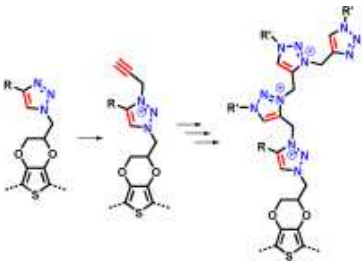
In the pits: Localized corrosion processes remain one of the most difficult objects to comprehensively characterize in situ. The concept of combined atomic force and scanning electrochemical microscopies is employed to simultaneously generate and visualize the early stages of pit nucleation and propagation on apparently homogeneous passive metal surfaces.



ChemElectroChem, July 16, 2015, DOI: 10.1002/celc.201500100

Guilhem Godeau, Thierry Darmanin, Frédéric Guittard

Step-by-Step Layer-by-Layer Assembly Using 1,2,3-Triazole as a Platform for Controlled Multicharged and Multifunctional Coatings [Full Paper]

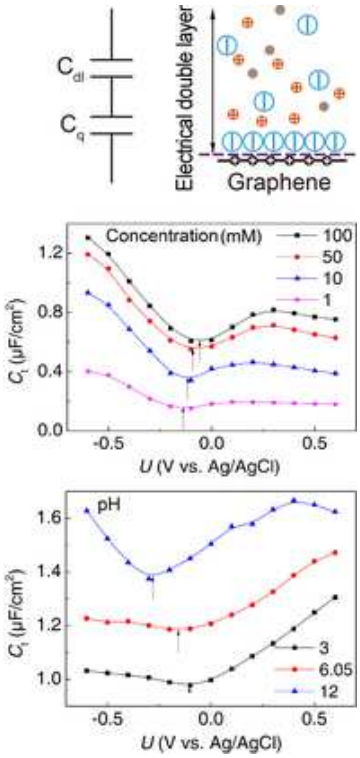


One step at a time: Multicharged and multifunctional coatings can now be prepared by layer-by-layer assembly and by using click chemistry. The charged moieties are due to the presence of triazolium groups, and various functional groups can be introduced in each layer (see scheme).

ChemPlusChem, July 16, 2015, DOI: 10.1002/cplu.201500214

Xiaowei Du, Hui Guo, Yan Jin, Qinghui Jin, Jianlong Zhao

Electrochemistry Investigation on the Graphene/Electrolyte Interface [Full Paper]

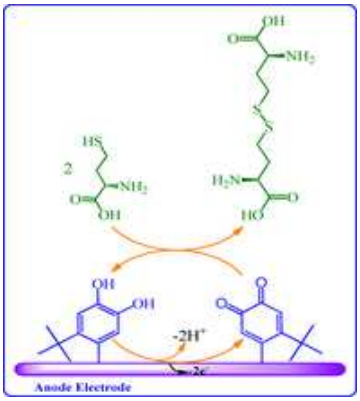


Electroanalysis, July 14, 2015, DOI: 10.1002/elan.201500302

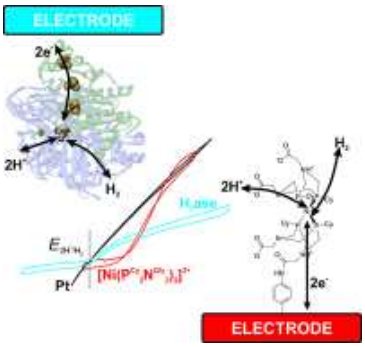
Hamid Salehzadeh, Davood Nematollahi, Saber Alizadeh

Electrografting of 4-*tert*-Butylcatechol on GC Electrode. Selective Electrochemical Determination of Homocysteine [Full Paper]

Electroanalysis, July 14, 2015, DOI: 10.1002/elan.201500091



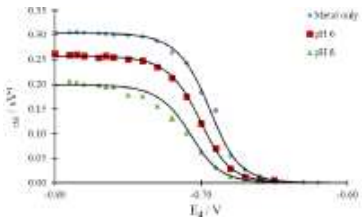
Patricia Rodriguez-Maciá, Arnab Dutta, Wolfgang Lubitz, Wendy J. Shaw, Olaf Rüdiger
Direct Comparison of the Performance of a Bio-inspired Synthetic Nickel Catalyst and a [NiFe]-Hydrogenase, Both Covalently Attached to Electrodes [Communication]



Inspirational performance: The H_2 oxidation performance of a surface-immobilized bio-inspired Ni-based complex is directly compared with [NiFe]-hydrogenase. The enzyme outperforms the Ni complex at high pH, while the Ni complex outperforms the enzyme at acidic pH and in the presence of CO. Both show competitive functionality compared to Pt. These results suggest benefits for both synthetic and natural catalysts in practical applications.

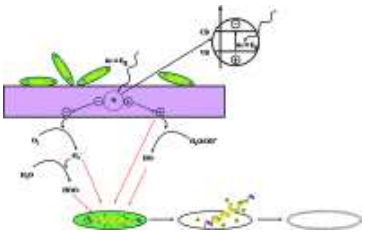
Angew. Chem. Int. Ed., July 3, 2015, DOI: 10.1002/anie.201502364

Gonçalo Vale, Cristiana Franco, Anna M. Brunnert, Margarida M. Correia dos Santos
Adsorption of Cadmium on Titanium Dioxide Nanoparticles in Freshwater Conditions – A Chemodynamic Study [Full Paper]



Electroanalysis, June 30, 2015, DOI: 10.1002/elan.201500153

Chaohong Liu, Dun Zhang
Bi_5O_7I Nanobelts: Synthesis, Modification, and Photocatalytic Antifouling Activity [Full Paper]



Keeping it clean: A crystal growth mechanism of Bi_5O_7I nanobelts is proposed. The modified Bi_5O_7I composites show excellent degradation activity of malachite green and bactericidal effects against *Pseudomonas aeruginosa*, which may be attributed to the higher charge carrier separation efficiency of these heterojunction structures (see figure).

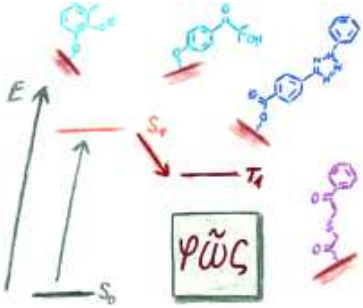
Chem. Eur. J., June 30, 2015, DOI: 10.1002/chem.201500383

Simon Giret, Michel Wong Chi Man, Carole Carcel
Mesoporous-Silica-Functionalized Nanoparticles for Drug Delivery [Concept]

Responding well to silica: Mesoporous silica nanoparticles (MSN) represent one of the most promising nanocarriers for drug delivery (see figure). This concept article describes how their functionalization has allowed the design of more efficient systems by improving their specific retention and uptake with targeted and stimuli-responsive properties.

Chem. Eur. J. **2015**, *21*, No. 40, 13850-13865

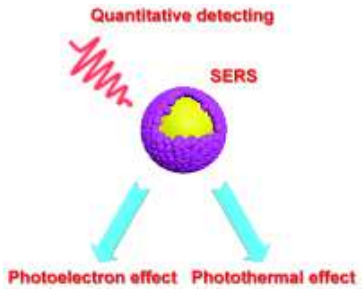
Guillaume Delaittre, Anja S. Goldmann, Jan O. Mueller, Christopher Barner-Kowollik
Efficient Photochemical Approaches for Spatially Resolved Surface Functionalization [Review]



"There are only patterns": A range of efficient photochemical platforms for the spatially resolved functionalization of surfaces is described in this Review together with their specific advantages relative to alternative methods. There is already a powerful range of methods available, but orthogonal ligation processes driven by visible light remain largely elusive.

Angew. Chem. Int. Ed. **2015**, *54*, No. 39, 11388-11403

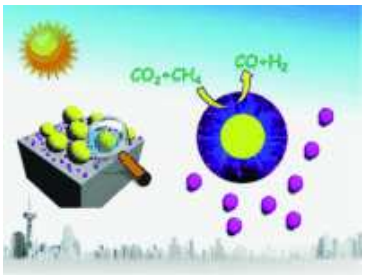
Hao Yang, Lan-Qi He, Yu-Wen Hu, Xihong Lu, Gao-Ren Li, Biju Liu, Bin Ren, Yexiang Tong, Ping-Ping Fang
Quantitative Detection of Photothermal and Photoelectrocatalytic Effects Induced by SPR from Au@Pt Nanoparticles [Communication]



The contribution ratio of the SPR-induced photothermal and photoelectrocatalytic effects during catalytic reactions can be detected. The photothermal effect can be measured by surface-enhanced Raman scattering (SERS), and the photoelectrocatalytic process can be proved by SERS using *p*-aminothiophenol as the probe molecule.

Angew. Chem. Int. Ed. **2015**, *54*, No. 39, 11462-11466

Huimin Liu, Xianguang Meng, Thang Duy Dao, Huabin Zhang, Peng Li, Kun Chang, Tao Wang, Mu Li, Tadaaki Nagao, Jinhua Ye
Conversion of Carbon Dioxide by Methane Reforming under Visible-Light Irradiation: Surface-Plasmon-Mediated Nonpolar Molecule Activation [Communication]



Storing solar energy: Gold enhances the catalytic performance of a Rh/SBA-15 catalyst in the dry reforming process of methane under visible-light irradiation (see picture). The highly energetic electrons excited by local surface plasmon resonances of gold facilitated the polarization and activation of carbon dioxide and methane under thermal conditions.

Angew. Chem. Int. Ed. **2015**, *54*, No. 39, 11545-11549

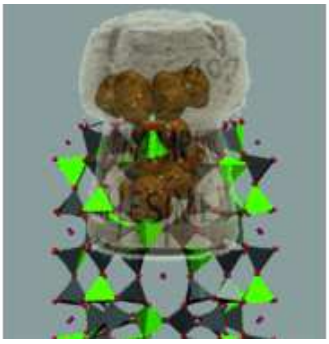
Doris Abt, Bernhard V. K. J. Schmidt, Ognen Pop-Georgievski, Alexander S. Quick, Denis Danilov, Nina Yu. Kostina, Michael Bruns, Wolfgang Wenzel, Martin Wegener, Cesar Rodriguez-Emmenegger, Christopher Barner-Kowollik
Designing Molecular Printboards: A Photolithographic Platform for Recodable Surfaces [Communication]

Shining light on the printboard: Photolithography of *β*-cyclodextrin host modules established on a polydopamine anchor layer was carried out to allow encoding, erasing, and recoding of supramolecular guest patterns on surfaces in a spatially resolved fashion.

Chem. Eur. J. **2015**, *21*, No. 38, 13186-13190

Gloria Tabacchi, Ettore Fois, Gion Calzaferri

Structure of Nanochannel Entrances in Stopcock-Functionalized Zeolite L Composites [Communication]

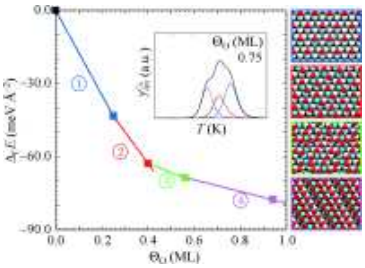


Message in a bottle: To address the lack of available microscale structural information on the site-specific functionalization of zeolite L (ZL), first-principles calculations are used to investigate how stopper molecules irreversibly modify ZL by condensing with OH groups at the channel entrances. The nature of the interactions of the tail group with the inner surface of the channels and the head group with the channel entrances are elucidated.

Angew. Chem. Int. Ed. **2015**, *54*, No. 38, 11112-11116

Donato Fantauzzi, Jonathan E. Mueller, Lehel Sabo, Adri C. T. van Duin, Timo Jacob

Surface Buckling and Subsurface Oxygen: Atomistic Insights into the Surface Oxidation of Pt(111) [Article]

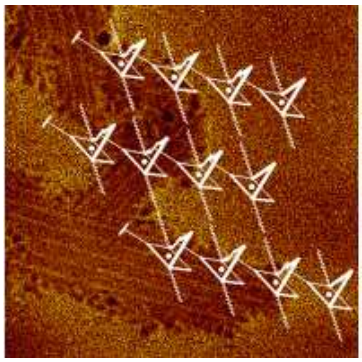


The surface oxidation of Pt(111) with up to one monolayer of oxygen involves four stable surface phases characterized by pure adsorbate, high- and low-coverage buckled, and subsurface-oxygen structures, as revealed by a ReaxFF reactive force field study. Surface buckling and subsurface oxygen are not only key structural motifs in the surface oxidation process but are also expected to impact the (electro)catalytic behavior of Pt(111).

ChemPhysChem **2015**, *16*, No. 13, 2797-2802

Vivien Rauch, Yoshihiro Kikkawa, Matthieu Koepf, Ismail Hijazi, Jennifer A. Wytko, Stéphane Campidelli, Antoine Goujon, Masatoshi Kanesato, Jean Weiss

Trapping Nanostructures on Surfaces through Weak Interactions [Full Paper]



Surface matters: AFM and solution studies of the noncovalent assembly of strapped porphyrins containing an imidazole side arm reveal the importance of various parameters on the morphology of nanoscale objects observed on surfaces (see figure). The role of surface–molecule interactions and how these interactions are affected by solvent and incubation time are deciphered.

Chem. Eur. J. **2015**, *21*, No. 38, 13437-13444

Manos Anyfantakis , Damien Baigl

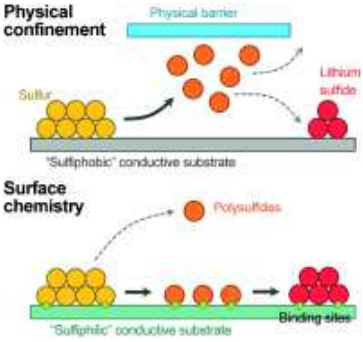
Manipulating the Coffee-Ring Effect: Interactions at Work [Concept]

Leaving a deposit: Interactions of particles with/at the liquid–gas (LG) and liquid–solid (LS) interfaces as well as bulk particle–particle interactions affect deposition from evaporating drops of a colloidal suspension. Exploiting the interactions–deposition relation opens the way to programmable particle patterning at interfaces and the development of biosensing platforms (see picture).

ChemPhysChem **2015**, *16*, No. 13, 2726-2734

Hong-Jie Peng, Qiang Zhang

Designing Host Materials for Sulfur Cathodes: From Physical Confinement to Surface Chemistry [Highlight]

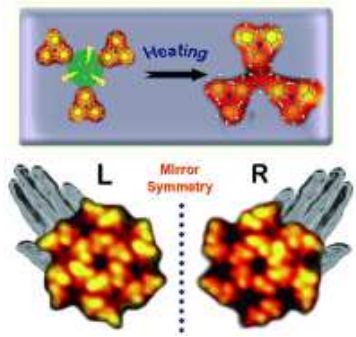


Sulfiphilic surfaces: The design of novel host materials for sulfur cathodes in lithium–sulfur batteries has been achieved through modification of the surface chemistry, by employing sulfiphilic surfaces with high electrical conductivity to develop stable, high-energy batteries. Compared to the physical-confinement technique (see picture), systems prepared by this method exhibited remarkable enhancements of both capacity and cycling stability.

Angew. Chem. Int. Ed. **2015**, *54*, No. 38, 11018-11020

Feifei Xiang, Yan Lu, Chao Li, Xin Song, Xiaoqing Liu, Zhongping Wang, Juan Liu, Mingdong Dong, Li Wang

Cyclotrimerization-Induced Chiral Supramolecular Structures of 4-Ethynyltriphenylamine on Au(111) Surface [Full Paper]

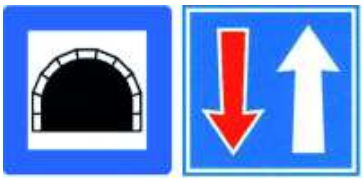


Healing hexagons: Highly selective [2+2+2] cyclization of 4-ethynyltriphenylamine (ETPA) molecules is achieved on a gold surface under ultra-high vacuum. These cyclotrimerized ETPA molecules self-assemble into chiral hexagonal supramolecular structures with an extraordinary self-healing ability after thermal treatment (see figure).

Chem. Eur. J. **2015**, *21*, No. 37, 12978-12983

Andreas Schachtschneider, Martin Wessig, Martin Spitzbarth, Adrian Donner, Christian Fischer, Malte Drescher, Sebastian Polarz

Directional Materials—Nanoporous Organosilica Monoliths with Multiple Gradients Prepared Using Click Chemistry [Communication]

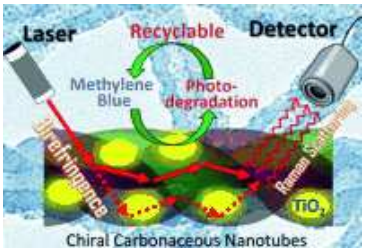


Right direction: Directionality in nanoporous materials could be achieved by introducing chemical gradients of surface-bound functional organic groups. Almost any desired functional group can be attached to the surface of the nanoporous material using click chemistry.

Angew. Chem. Int. Ed. **2015**, *54*, No. 36, 10465-10469

Bocheng Qiu, Mingyang Xing, Qiuying Yi, Jinlong Zhang

Chiral Carbonaceous Nanotubes Modified with Titania Nanocrystals: Plasmon-Free and Recyclable SERS Sensitivity [Communication]

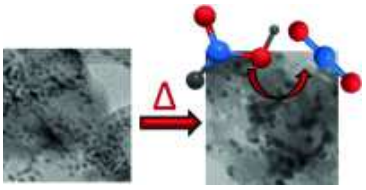


Chiral carbonaceous nanotubes (CNTs) with TiO_2 nanocrystals were used in plasmon-free surface-enhanced Raman scattering (SERS) detection and successful recycling of SERS substrate was realized. The high SERS sensitivity of methylene blue (MB) over the CNT/TiO_2 hybrids is ascribed to the laser-driven birefringence induced by the helical structure.

Angew. Chem. Int. Ed. **2015**, *54*, No. 36, 10643-10647

Jo J. L. Humphrey, Sajanikumari Sadasivan, Daniela Plana, Verónica Celorrio, Robert A. Tooze, David J. Fermín

Surface Activation of Pt Nanoparticles Synthesised by "Hot Injection" in the Presence of Oleylamine [Full Paper]

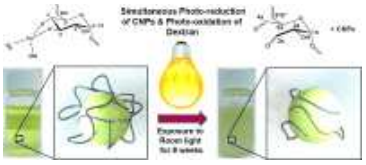


The removal of oleylamine from Pt nanostructures, synthesised by "hot injection", was assessed employing a range of chemical and thermal methods. The acute sensitivity of Pt reactivity to organic species provides an ideal framework for quantifying the effectiveness of the pre-treatment methods. Surface-sensitive probes such as H-adsorption and the oxidations of HCOOH and adsorbed CO were used as electrochemical performance indicators. Annealing in Ar (400 °C) or H_2 (300 °C) resulted in highly active surfaces and the thermal desorption mechanism was investigated by thermogravimetric analysis mass spectrometry.

Chem. Eur. J. **2015**, *21*, No. 36, 12694-12701

Swetha Barkam, Soumen Das, Shashank Saraf, Rameech McCormack, David Richardson, Leonel Atencio, Vanessa Moosavifazel, Sudipta Seal

The Change in Antioxidant Properties of Dextran-Coated Redox Active Nanoparticles Due to Synergetic Photoreduction–Oxidation [Full Paper]

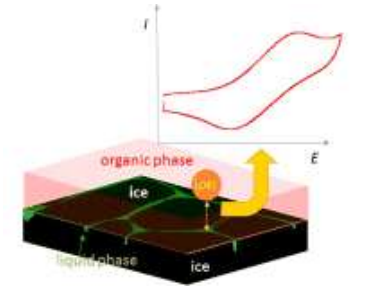


In a new light: Extreme sensitivity of dextran–nanoparticles (Dex–CNPs) to visible light is demonstrated by using room light with a clear indication of a unique synergetic phenomenon of photoreduction of CNPs in the presence of dextran, which undergoes simultaneous oxidation. The physiochemical changes of Dex–CNPs and the surrounding microenvironment of Dex–CNPs are significantly altered on exposure to visible light, thereby affecting the biological response.

Chem. Eur. J. **2015**, *21*, No. 36, 12646-12656

Hui Qu, Makoto Harada, Tetsuo Okada

Ion-Transfer Voltammetry at the Interface between Organic and Salt-Doped Ice Phases [Communication]

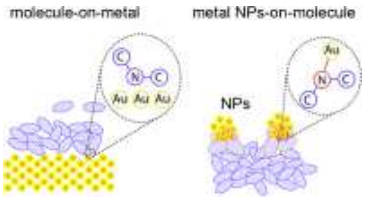


Ice, ice, baby: Ion-transfer voltammetry at the interface between frozen aqueous NaCl and an organic phase is measured with a simple and versatile method to study the hydration of ions in the liquid phase coexistent with ice.

ChemElectroChem **2015**, *2*, No. 09, 1249-1253

Giovanni Ligorio, Marco Vittorio Nardi, Christos Christodoulou, Norbert Koch

Organic Semiconductor/Gold Interface Interactions: From Physisorption on Planar Surfaces to Chemical Reactions with Metal Nanoparticles [Article]



Size matters: The interface between Au and small-molecule organic semiconductors is investigated by X-ray photoelectron spectroscopy. Whereas molecule-on-bulk metal systems show only physisorptive interaction, the metal nanoparticles (NPs)-on-molecule systems exhibit high chemical reactivity resulting in the formation of organometallic complexes (see picture).

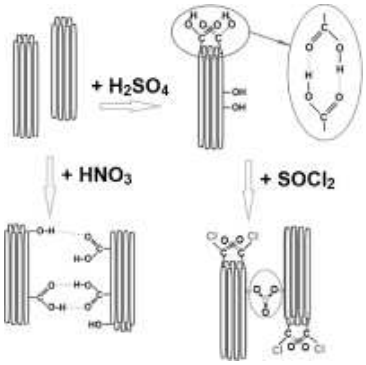
ChemPhysChem **2015**, *16*, No. 12, 2602-2608

Xavier Devaux, Brigitte Vigolo, Edward McRae, Fabrice Valsaque, Naoual Allali, Victor Mamane, Yves Fort, Alexander V. Soldatov, Manuel Dossot, Svetlana Yu. Tsareva

Covalent Functionalization of HiPco Single-Walled Carbon Nanotubes: Differences in the Oxidizing Action of H_2SO_4 and HNO_3 during a Soft Oxidation Process [Article]

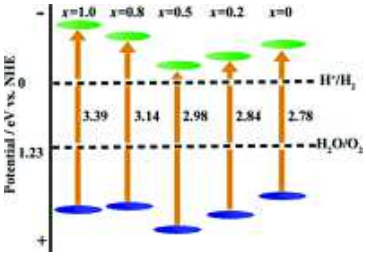
Position matters: This work presents the results of a study on the location of grafted functions on the surface of HiPco nanotubes and on the changes in morphological characteristics of the samples during the oxidizing action of H_2SO_4 and HNO_3 as well as during subsequent chlorination of the oxH_2SO_4-SWCNT sample.

ChemPhysChem **2015**, *16*, No. 12, 2692-2701



Xing Zhang, Li-Wei Wang, Chu-Ya Wang, Wei-Kang Wang, Ya-Li Chen, Yu-Xi Huang, Wen-Wei Li, Yu-Jie Feng, Han-Qing Yu

Synthesis of $BiOCl_xBr_{1-x}$ Nanoplate Solid Solutions as a Robust Photocatalyst with Tunable Band Structure [Full Paper]

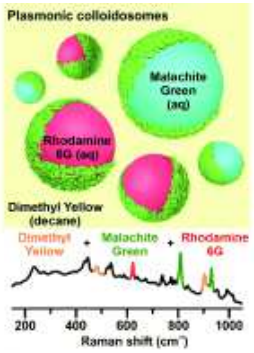


The right balance: $BiOCl_xBr_{1-x}$ solid solution of nanoplates crystallize in a homogeneous crystal structure but possess continuously tuned band gaps from 3.39 to 2.78 eV by decreasing the ratio of Cl/Br (see figure).

Chem. Eur. J. **2015**, *21*, No. 33, 11872-11877

Gia Chuong Phan-Quang, Hiang Kwee Lee, In Yee Phang, Xing Yi Ling

Plasmonic Colloidosomes as Three-Dimensional SERS Platforms with Enhanced Surface Area for Multiphase Sub-Microliter Toxin Sensing [Communication]

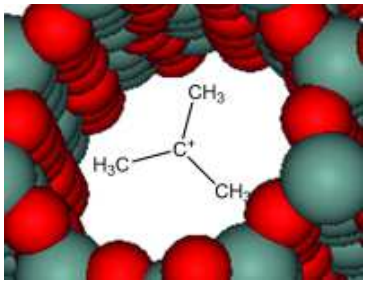


Toxin detection: Plasmonic colloidosomes constructed from silver nanocubes are fabricated as emulsion-based three-dimensional surface-enhanced surface scattering (SERS; see picture) platforms. The colloidosomes show excellent mechanical robustness, flexible size tunability, versatility to merge, and ultrasensitivity in SERS quantitation of sub-femtomole toxin.

Angew. Chem. Int. Ed. **2015**, *54*, No. 33, 9691-9695

Gerd Buntkowsky, Torsten Gutmann

A Mousetrap for Carbenium Ions: NMR Detectives at Work [Highlight]



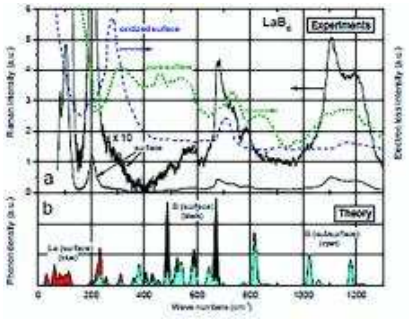
The combined efforts of German and Chinese scientists applying solid-state NMR spectroscopy, DFT calculations, and chemical modeling provided experimental proof of the *tert*-butyl cation as a reaction intermediate in the butene/isobutene conversion on acidic zeolites.

Angew. Chem. Int. Ed. **2015**, *54*, No. 33, 9450-9451

Helmut Werheit, Volodimir Filipov, Natalya Shitsevalova

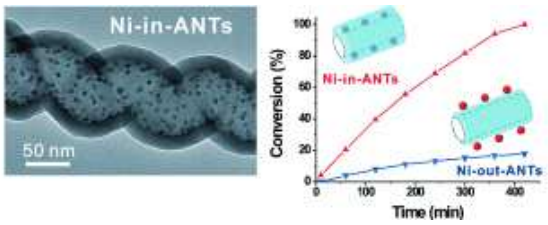
Confined Raman Scattering – Easy Access to the Surface Phonons of Specific Crystalline Solids [Article]

Z. anorg. allg. Chem. **2015**, *641*, No. 10, 1835-1844



Zhe Gao, Mei Dong, Guizhen Wang, Pei Sheng, Zhiwei Wu, Huimin Yang, Bin Zhang, Guofu Wang, Jianguo Wang, Yong Qin

Multiply Confined Nickel Nanocatalysts Produced by Atomic Layer Deposition for Hydrogenation Reactions [Communication]



Nanoreactor: A template-assisted atomic layer deposition method was employed to synthesize Ni nanoparticles not only confined in Al_2O_3 nanotubes (ANTs), but also to the cavities of the tube interior wall. The increased metal–support interface and protecting nanotubes lead to greatly improved activity and stability for hydrogenation of cinnamaldehyde and nitrobenzene.

Angew. Chem. Int. Ed. **2015**, *54*, No. 31, 9006-9010

Xiaozhou Zhang, Sabrina Heng, Andrew. D. Abell

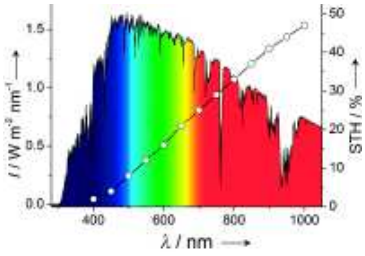
Photoregulation of α-Chymotrypsin Activity by Spiropyran-Based Inhibitors in Solution and Attached to an Optical Fiber [Full Paper]

Switch the enzyme activity on and off: The first examples of spiropyran-based protease inhibitors are reported. Here the inhibitory activity can be controlled by irradiation with light of a specific wavelength, both in solution and on attachment to an optical fiber. The unique ability to modulate enzyme activity in nanoliters of sample fluids with a fiber provides an important basis for biosensing applications.

Chem. Eur. J. **2015**, *21*, No. 30, 10703-10713

Jinshui Zhang, Xinchen Wang

Solar Water Splitting at λ=600 nm: A Step Closer to Sustainable Hydrogen Production [Highlight]



Overall water splitting with a semiconductor photocatalyst under visible-light irradiation is considered as a “dream reaction” in chemistry. The development of a 600 nm photocatalyst for solar water splitting highlighted here is not only an important milestone towards sustainable hydrogen production, but also a new starting point for artificial photosynthesis. STH=solar-to-hydrogen energy conversion efficiency.

Angew. Chem. Int. Ed. **2015**, *54*, No. 25, 7230-7232

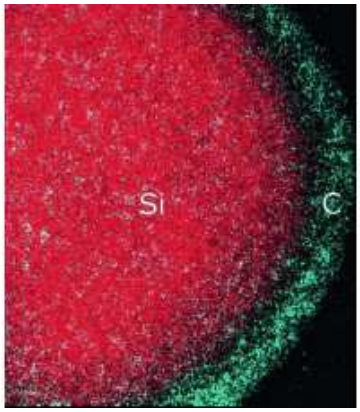
Song Lou, Duolong Di

Retracted: Adsorption Features of Flavonoids on Macroporous Adsorption Resins Functionalized with Ionic Liquids [Retraction]

ChemPhysChem **2015**, *16*, No. 07, 1329

Seoung-Bum Son, Branden Kappes, Chunmei Ban

Surface Modification of Silicon Anodes for Durable and High-Energy Lithium-Ion Batteries [Review]



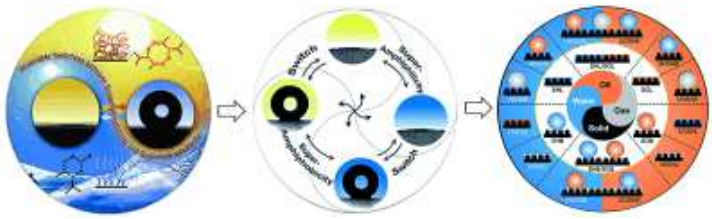
Isr. J. Chem. **2015**, *55*, No. 05, 558-569

Wen Liu, Pilgun Oh, Xien Liu, Min-Joon Lee, Woongrae Cho, Sujong Chae, Youngsik Kim, Jaephil Cho
Nickel-Rich Layered Lithium Transition-Metal Oxide for High-Energy Lithium-Ion Batteries [Review]

The end is Ni: Over the past two decades, nickel-rich materials have become highly promising candidates for high-energy cathode materials for lithium-ion batteries. This Review brings a new perspective to Ni-rich materials as well as providing a comprehensive account of recent progress, limits, and new utilization possibilities for these materials. ESS=energy storage systems, EV=electric vehicles, HEV=hybrid electric vehicles, Mobile=mobile appliances.

Angew. Chem. Int. Ed. **2015**, *54*, No. 15, 4440-4457

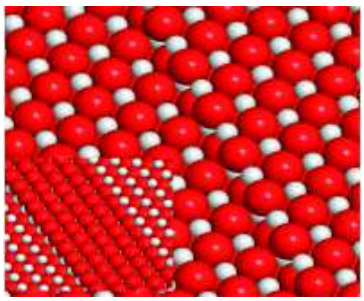
Liping Wen, Ye Tian, Lei Jiang
Bioinspired Super-Wettability from Fundamental Research to Practical Applications [Review]



Wet, wet, wet: Surfaces with super-wettability, including three-dimensional, two-dimensional, and one-dimensional materials surfaces can be prepared. By combining different super-wettability properties, novel functional solid/liquid interfacial systems can be generated and integrated into devices for tackling many different problems.

Angew. Chem. Int. Ed. **2015**, *54*, No. 11, 3387-3399

Robert Schlögl
Heterogeneous Catalysis [Review]

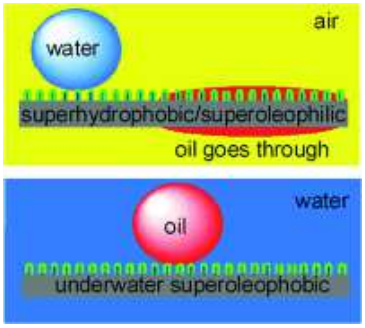


Filling the gaps: The understanding of heterogeneous catalysis is built on a standard model of interface catalysis that was developed from surface physics and theory. This model has significant gaps with regards to transferring knowledge yielded to high-performance catalysts, and approaches to fill these gaps are proposed in this Review.

Angew. Chem. Int. Ed. **2015**, *54*, No. 11, 3465-3520

Zonglin Chu, Yujun Feng, Stefan Seeger
Oil/Water Separation with Selective Superantiwetting/Superwetting Surface Materials [Review]

Stringent segregation: Superhydrophobic/superoleophilic surfaces and underwater superoleophobic surfaces have been

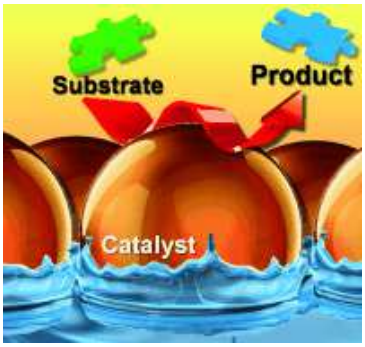


successfully designed, fabricated, and employed in the separation of oil/water-free mixtures and emulsions on the basis of their selective superantiwetting/superwetting properties towards water and oil. Progress, remaining problems, and future challenges in this field are discussed in this Review.

Angew. Chem. Int. Ed. **2015**, *54*, No. 08, 2328-2338

Marc Pera-Titus, Loïc Leclercq, Jean-Marc Clacens, Floryan De Campo, Véronique Nardello-Rataj

Pickering Interfacial Catalysis for Biphasic Systems: From Emulsion Design to Green Reactions [Minireview]



What a pick! Pickering emulsions are surfactant-free dispersions of two immiscible fluids which are kinetically stabilized by colloidal particles. This review describes recent examples of hybrid and composite amphiphilic materials for the design of interfacial catalysts in Pickering emulsions for industrially relevant biphasic reactions in fine chemistry, biofuel upgrading, and depollution.

Angew. Chem. Int. Ed. **2015**, *54*, No. 07, 2006-2021

Yu Wang, Wei-Hong Zhong

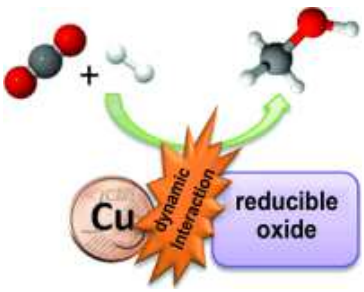
Development of Electrolytes towards Achieving Safe and High-Performance Energy-Storage Devices: A Review [Review]

Liquid, solid, or gel? High-performance electrolytes are important for the success of advanced energy-storage devices. From the view of battery structures and the electrolyte, this Review not only summarizes and discusses the up-to-date development of various electrolyte materials (liquids, solids, and gels), but also emphasizes a comprehensive understanding of electrolyte properties, which is critical for the design of high-performance electrolytes.

ChemElectroChem **2015**, *2*, No. 01, 22-36

Malte Behrens

Heterogeneous Catalysis of CO_2 Conversion to Methanol on Copper Surfaces [Highlight]



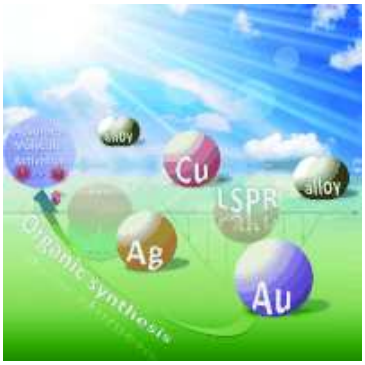
Combined experimental and theoretical approaches resulted in a better understanding of the hydrogenation of CO_2 to methanol on copper-based catalysts. These results highlight the important role of the reducible oxide promoter for CO_2 activation.

Angew. Chem. Int. Ed. **2014**, *53*, No. 45, 12022-12024

Qi Xiao, Esa Jaatinen, Huaiyong Zhu

Direct Photocatalysis for Organic Synthesis by Using Plasmonic-Metal Nanoparticles Irradiated with Visible Light [Focus Review]

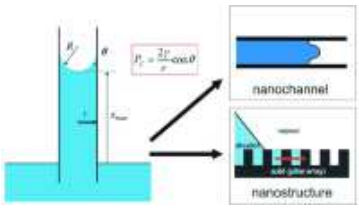
Making changes with visible light: Recent developments in the direct photocatalysis of plasmonic-metal nanoparticles are described, with a focus on the role of the localized surface plasmon resonance (LSPR) effect in plasmonic metals and their applications in organic transformations (see figure). The role of light irradiation in the catalyzed reactions and the light-excited energetic electron reaction mechanisms will be highlighted.



Chem. Asian J. **2014**, *9*, No. 11, 3046-3064

Frederik H. Kriel, Rossen Sedev, Craig Priest

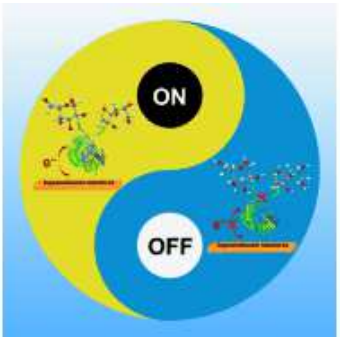
Capillary Filling of Nanoscale Channels and Surface Structure [Review]



Isr. J. Chem. **2014**, *54*, No. 11-12, 1519-1532

Pengbo Wan, Xiaodong Chen

Stimuli-Responsive Supramolecular Interfaces for Controllable Bioelectrocatalysis [Minireview]

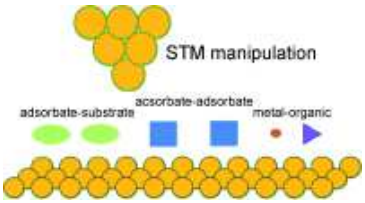


Controllable bioelectrocatalysis: The reversible activation of bioelectrocatalysis by external stimuli at stimuli-responsive supramolecular interfaces integrated with redox enzymes has been established, allowing potential applications in controllable biofuel cells, biosensors, bioelectronic devices, and for energy transduction and information storage. This Minireview outlines the current knowledge and important trends in this area.

ChemElectroChem **2014**, *1*, No. 10, 1602-1612

Qiang Sun, Wei Xu

Regulating the Interactions of Adsorbates on Surfaces by Scanning Tunneling Microscopy Manipulation [Minireview]

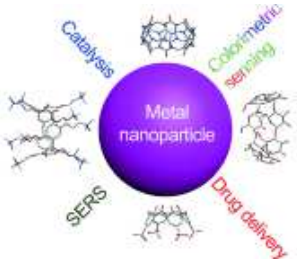


Tunnel vision: Recent progress in applying scanning tunneling microscopy (STM) manipulations to regulate the inter-adsorbate and adsorbate–substrate interactions on solid surfaces is reviewed (see figure). This technique has demonstrated a versatile and general method to not only differentiate intermolecular interactions but also construct molecular nanostructures by regulating the adsorbate interactions.

ChemPhysChem **2014**, *15*, No. 13, 2657-2663

Verónica Montes-García, Jorge Pérez-Juste, Isabel Pastoriza-Santos, Luis M. Liz-Marzán

Metal Nanoparticles and Supramolecular Macrocycles: A Tale of Synergy [Minireview]

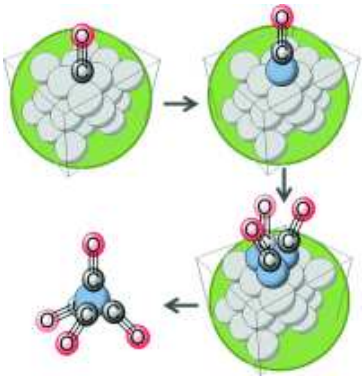


Nanoparticles and macrocycles: Recent literature regarding the combination of supramolecular macrocycles and metal nanoparticles is reviewed, with particular emphasis on the synthesis, surface modification and assembly, as well as the potential applications of the obtained nanocomposites (SERS = surface-enhanced Raman spectroscopy).

Chem. Eur. J. **2014**, *20*, No. 35, 10874-10883

Sophie Carenco

Carbon Monoxide-Induced Dynamic Metal-Surface Nanostructuring [Minireview]

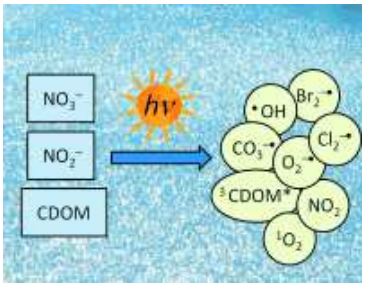


Nanoparticles and reactive surfaces: This Minireview provides an overview of selected CO-induced nanostructuring (see scheme). Recent examples of metal-surface and nanoparticle restructuring as a consequence of exposure to CO are discussed and show that nanoscale structures can be obtained under fairly mild conditions. Several cases of mono- and bimetallic compounds are described that show a range of behaviours in relation with the metal–CO interaction strength.

Chem. Eur. J. **2014**, *20*, No. 34, 10616-10625

Davide Vione, Marco Minella, Valter Maurino, Claudio Minero

Indirect Photochemistry in Sunlit Surface Waters: Photoinduced Production of Reactive Transient Species [Review]



Shine a light on your chemistry! This paper gives an overview of the reactive transient species that are produced in surface waters by sunlight irradiation of photoactive molecules (photosensitizers), such as nitrate, nitrite, and chromophoric dissolved organic matter (CDOM) (see scheme). The main transient species (·OH, $CO_3^{-\cdot}$, $^1O_2$, and CDOM triplet states) are involved in the indirect phototransformation of a very wide range of organic pollutants in surface waters.

Chem. Eur. J. **2014**, *20*, No. 34, 10590-10606

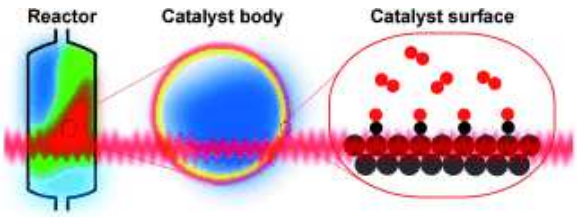
Rutger A. van Santen

Catalytic Paradigms: A Riddle and a Puzzle [Essay]

Angew. Chem. Int. Ed. **2014**, *53*, No. 33, 8618-8620

Zoran Ristanović, Bert M. Weckhuysen

Breakthroughs in Hard X-ray Diffraction: Towards a Multiscale Science Approach in Heterogeneous Catalysis [Highlight]



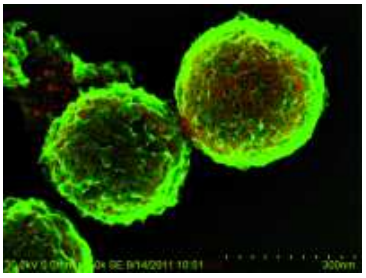
Diffraction at hard work: Modern heterogeneous catalysis would benefit from a multiscale science approach bridging the molecular world with the macroscopic world. Because of recent breakthroughs in X-ray diffraction methods, including the surface X-ray diffraction of atomically flat model catalysts, X-ray diffraction tomography of catalyst bodies, and X-ray profiling of an active catalyst in a chemical reactor, such an approach is now within reach.

Angew. Chem. Int. Ed. **2014**, *53*, No. 33, 8556-8558

Ferdi Schüth

Control of Solid Catalysts Down to the Atomic Scale: Where is the Limit? [Essay]

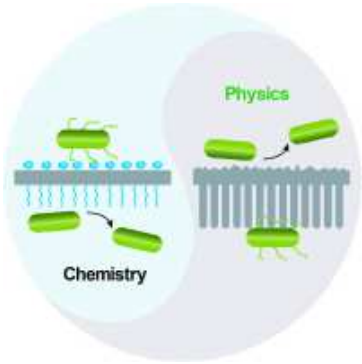
Down to the last detail: Nanostructured solid catalysts were already known in the early 20th century, but their exact structure was unclear. Nowadays, the arrangement of atoms and particles in solids can be manipulated and analyzed down to the atomic scale (see image). The use of specific highly active catalysts enables industrially relevant reactions to be performed at room temperature.



Angew. Chem. Int. Ed. **2014**, *53*, No. 33, 8599-8604

Jingxin Meng, Pengchao Zhang, Shutao Wang

Recent Progress in Biointerfaces with Controlled Bacterial Adhesion by Using Chemical and Physical Methods [Focus Review]

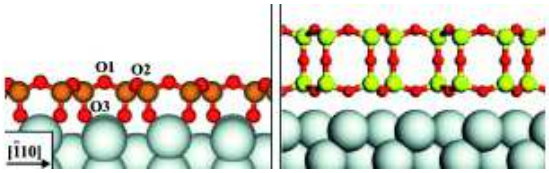


Stick or twist: Recent progress in biointerfaces based on smart-responsive molecules or surface topographies has led to efficient approaches for controlling the adhesive behavior of bacteria.

Chem. Asian J. **2014**, *9*, No. 08, 2004-2016

Christin Büchner, Leonid Lichtenstein, Xin Yu, J. Anibal Boscoboinik, Bing Yang, William E. Kaden, Markus Heyde, Shamil K. Shaikhutdinov, Radosław Włodarczyk, Marek Sierka, Joachim Sauer, Hans-Joachim Freund

Ultrathin Silica Films: The Atomic Structure of Two-Dimensional Crystals and Glasses [Minireview]

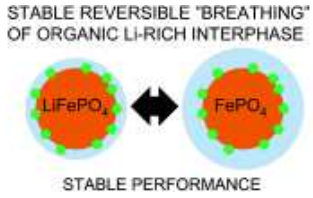


Polishing up the crystal glasses: An overview of the preparation and characterization of ordered silica films on metal supports is reported. In particular, the specific case of a silica bilayer, which exists in a crystalline and a vitreous variety, is discussed and a model of the vitreous silica structure proposed by William Zachariasen in 1932 is verified. Beyond this, the possibility to prepare the crystalline and the glassy structure on the same support leads to the study of the crystal–glass phase transition in real space (see figure).

Chem. Eur. J. **2014**, *20*, No. 30, 9176-9183

Nicolas Dupré, Marine Cuisinier, Jean-Frederic Martin, Dominique Guyomard

Interphase Evolution at Two Promising Electrode Materials for Li-Ion Batteries: $LiFePO_4$ and $LiNi_{1/2}Mn_{1/2}O_2$ [Review]



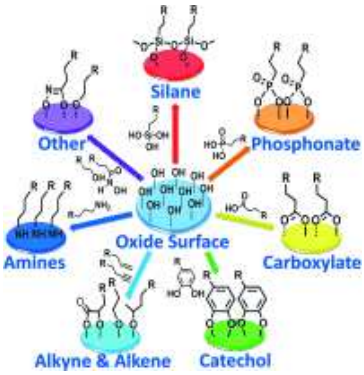
The importance of the chemical history of the electrode surface before electrochemical cycling as well as the correlation between interface phenomena, the formation/evolution of an interphase, and the electrochemical behavior of $LiFePO_4$ and $LiNi_{1/2}Mn_{1/2}O_2$ electrodes are investigated by magic-angle-spinning nuclear magnetic resonance, electron energy loss spectroscopy, and X-ray photoelectron spectroscopy. These techniques allow the study of interface aging and failure mechanisms.

ChemPhysChem **2014**, *15*, No. 10, 1922-1938

Sidharam P. Pujari, Luc Scheres, Antonius T. M. Marcelis, Han Zuilhof

Covalent Surface Modification of Oxide Surfaces [Review]

Not just scratching the surface: Covalently attached monolayers on oxide surfaces are reviewed with an eye to improved robustness, increased functionalization, understanding structural details, and the resulting potential for applications. Such

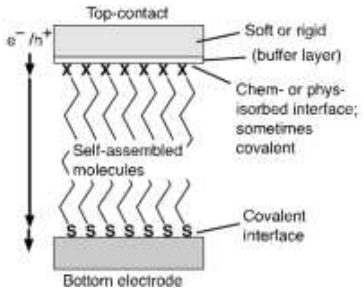


monolayers, provided they are robust enough, provide a way of improving the properties of the bulk oxide material.

Angew. Chem. Int. Ed. **2014**, *53*, No. 25, 6322-6356

Yanxi Zhang, Zhiyuan Zhao, Davide Fracasso, Ryan C. Chiechi

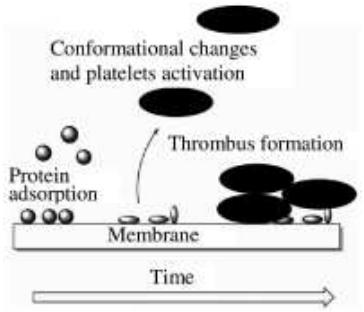
Bottom-Up Molecular Tunneling Junctions Formed by Self-Assembly [Review]



Isr. J. Chem. **2014**, *54*, No. 05-6, 513-533

Marcin Pawlak, Eric Bakker

Chemical Modification of Polymer Ion-Selective Membrane Electrode Surfaces [Review]



Electroanalysis **2014**, *26*, No. 06, 1121-1131

Sebastian Schlücker

Surface-Enhanced Raman Spectroscopy: Concepts and Chemical Applications [Review]

Expanding vibrational spectroscopy: Since its first observation in 1973, surface-enhanced Raman scattering (SERS) has developed into a mature vibrational spectroscopic technique. The number of applications in chemistry as well as the material and life sciences is increasing rapidly. This Review summarizes the key concepts behind SERS and provides an overview of current applications in chemistry.

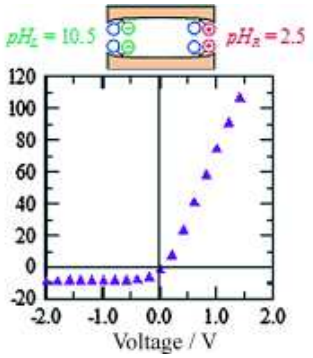
Angew. Chem. Int. Ed. **2014**, *53*, No. 19, 4756-4795

Patricio Ramirez, Javier Cervera, Mubarak Ali, Wolfgang Ensinger, Salvador Mafe

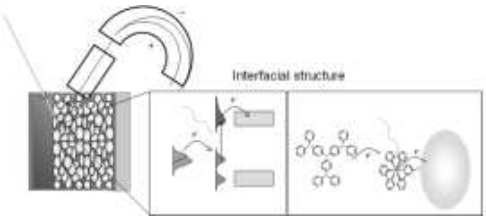
Logic Functions with Stimuli-Responsive Single Nanopores [Concept]

Porefection: Electrochemical transducers based on single stimuli-responsive polymeric nanopores can support a complete set of logic functions. Thermal, chemical, electrical, and optical stimuli are the input signals required to externally tune the pore conductance (i.e. the logical output).

ChemElectroChem **2014**, *1*, No. 04, 698-705



Erik M. J. Johansson, Rebecka Lindblad, Hans Siegbahn, Anders Hagfeldt, Hakan Rensmo
Atomic and Electronic Structures of Interfaces in Dye-Sensitized, Nanostructured Solar Cells [Review]



Core of the matter: Key processes in nanostructured dye-sensitized solar cells (DSC) occur at material interfaces containing, for example, oxides, dye molecules, and hole conductors (see picture). The implementation of X-ray-based spectroscopic methods for atomic-level understanding of such properties is reviewed. Examples include energy matching, binding configurations, and molecular orbital composition.

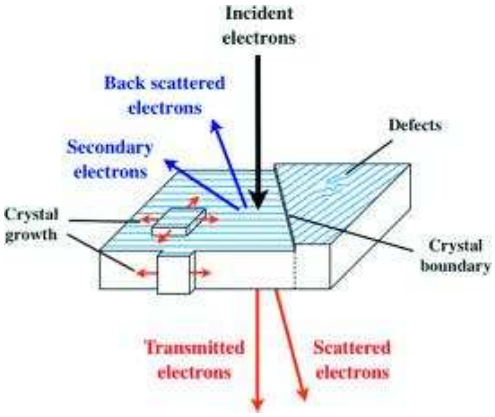
ChemPhysChem **2014**, *15*, No. 06, 1006-1017

Steven E. F. Kleijn, Stanley C. S. Lai, Marc T. M. Koper, Patrick R. Unwin
Electrochemistry of Nanoparticles [Review]

Revealing electrochemistry: Key issues related to the electrochemistry of nanoparticles are being uncovered through innovative techniques capable of relating activity and structure, ultimately at the level of a single nanoparticle. Recent advances in experimental approaches are discussed and assessed, with particular emphasis on those that enhance the fundamental understanding of electrocatalysis and nanoscale electrochemistry.

Angew. Chem. Int. Ed. **2014**, *53*, No. 14, 3558-3586

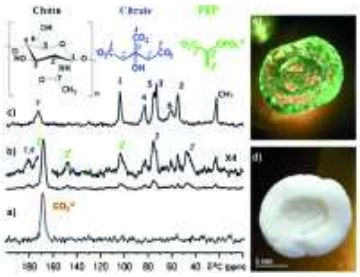
Lu Han, Tetsu Ohsuna, Zheng Liu, Viveka Alfredsson, Tomas Kjellman, Shunsuke Asahina, Mitsuo Suga, Yanhang Ma, Peter Oleynikov, Keiichi Miyasaka, Alvaro Mayoral, Isabel Díaz, Yasuhiro Sakamoto, Sam M. Stevens, Michael W. Anderson, Changhong Xiao, Nobuhisa Fujita, Alfonso Garcia-Bennett, Kyung Byung Yoon, Shunai Che, Osamu Terasaki
Structures of Silica-Based Nanoporous Materials Revealed by Microscopy [Review]



Z. anorg. allg. Chem. **2014**, *640*, No. 03-4, 521-536

Ira Ben Shir, Shifi Kababya, Asher Schmidt
Molecular-Level Structure-Property Relationships in Biogenic Calcium Carbonates: The Unique Insights of Solid-

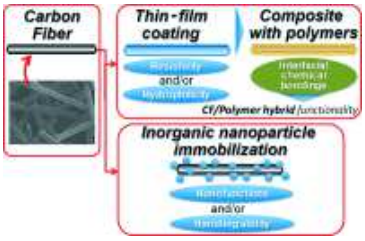
State NMR Spectroscopy [Review]



Isr. J. Chem. **2014**, *54*, No. 01-2, 74-85

Kota Shiba, Motohiro Tagaya, Sadaki Samitsu, Satoshi Motozuka

Effective Surface Functionalization of Carbon Fibers for Fiber/Polymer Composites with Tailor-Made Interfaces [Minireview]



High in fiber: Carbon fibers (CFs), which are widely utilized in fields ranging from fundamental research to industry, can be functionalized by both thin-layer coating and nanoparticle immobilization (see scheme). In this Minireview, these techniques and some practical applications of functionalized CFs, such as carbon fiber reinforced plastic (CFRP), are overviewed after briefly describing the basic properties of CFs.

ChemPlusChem **2014**, *79*, No. 02, 197-210

Jonas Björk, Felix Hanke

Towards Design Rules for Covalent Nanostructures on Metal Surfaces [Concept]

Rational design at the nanoscale: Covalent assembly of molecular building blocks is a promising strategy to obtain functional nanostructures in one and two dimensions. This Concept article discusses how computational modeling could be used to obtain design rules that will advance this field towards the predictive design of specific functionalities on specific surfaces (see figure).

Chem. Eur. J. **2014**, *20*, No. 04, 928-934
