

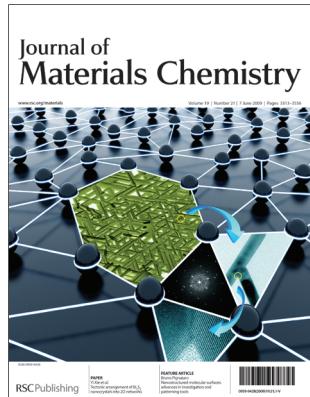
# Journal of Materials Chemistry

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## IN THIS ISSUE

ISSN 0959-9428 CODEN JMACEP 19(21) 3313–3556 (2009)



### Cover

See Y. Xie *et al.*, pp. 3378–3383.  
Tectonic arrangement of  $\text{Bi}_2\text{S}_3$  nanocrystals into 2D networks.  
Image reproduced by permission of Yi Xie from *J. Mater. Chem.*, 2009, **19**, 3378.



### Inside cover

See Jianlin Shi *et al.*, pp. 3395–3403.  
Rhodamine B-co-condensed spherical SBA-15 fluorescence nanoparticles, with large doping amounts of covalently bonded and highly monodispersed RhB within mesoporous channels exhibit high fluorescence quantum yields and fluorescence detectivity and excellent photostability.  
Image reproduced by permission of Jianlin Shi from *J. Mater. Chem.*, 2009, **19**, 3395.

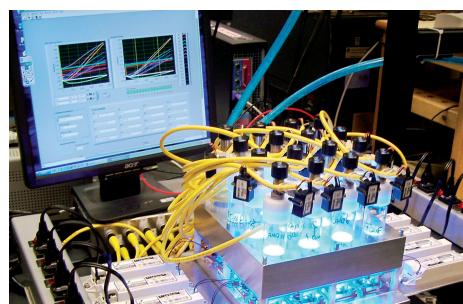
## HIGHLIGHT

3328

### Progress towards solar-powered homogeneous water photolysis

Leonard L. Tinker, Neal D. McDaniel and Stefan Bernhard\*

Growing energy demand is pressuring society to implement sustainable energy techniques, and therefore, efforts to develop homogeneous systems that use sunlight to split water into molecular hydrogen and oxygen are discussed.



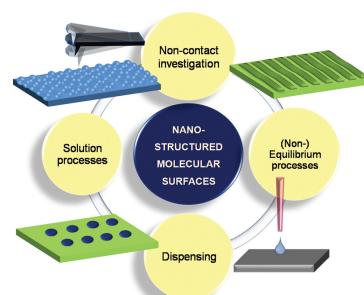
## FEATURE ARTICLES

3338

### Nanostructured molecular surfaces: advances in investigation and patterning tools

Bruno Pignataro\*

Nanostructured molecular surfaces play a central role in many scientific and technological issues. Important advancements on the development of investigation and patterning tools are highlighted.



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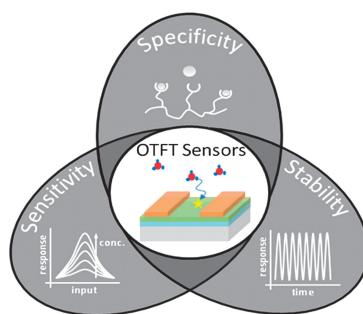
## FEATURE ARTICLES

3351

**Material and device considerations for organic thin-film transistor sensors**

Mark E. Roberts, Anatoliy N. Sokolov and Zhenan Bao\*

Progress towards improved sensitivity, selectivity and stability of organic field-effect transistor (OFET) sensors based on low-cost, flexible and synthetically versatile organic materials has the field primed for potential applications in portable detection.



## COMMUNICATIONS

3364

**Benzo[b]phosphole sulfides. Highly electron-transporting and thermally stable molecular materials for organic semiconductor devices**

Hayato Tsuji,\* Kosuke Sato, Yoshiharu Sato\* and Eiichi Nakamura\*

A benzo[b]phosphole sulfide derivative **DBPSB** was found to function as a new class of *n*-type amorphous organic material, which features high electron drift mobility and high thermal stability, and the utility of this compound was demonstrated in an organic light-emitting diode.



$$\mu_e = 2 \times 10^{-3} \text{ cm}^2/\text{Vs}$$

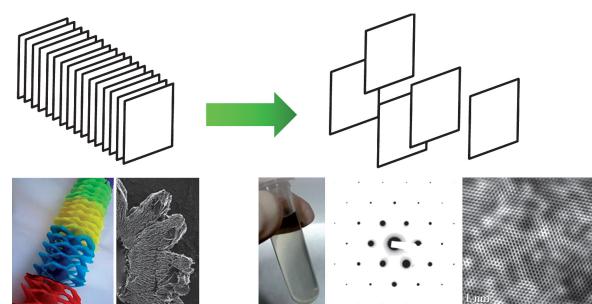
$$T_g = 148^\circ\text{C}$$

3367

**Graphene sheets from worm-like exfoliated graphite**

Wentian Gu, Wei Zhang, Xinming Li, Hongwei Zhu,\* Jinquan Wei, Zhen Li, Qinke Shu, Chen Wang, Kunlin Wang, Wanci Shen, Feiyu Kang and Dehai Wu

High quality graphene sheets have been prepared by a facile liquid phase exfoliation of loose and porous worm-like graphite (WEG). This approach combining with the advances in large scale industry manufacturing of WEG could potentially lead to the development of new and more effective graphene products.

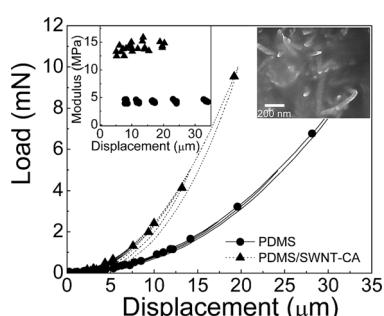


3370

**Stiff and electrically conductive composites of carbon nanotube aerogels and polymers**

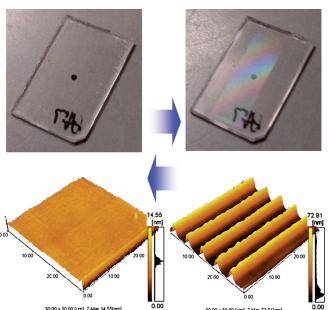
Marcus A. Worsley,\* Sergei O. Kucheyev, Joshua D. Kuntz, Alex V. Hamza, Joe H. Satcher, Jr. and Theodore F. Baumann

Single-walled carbon nanotube-based nanofoams are used as scaffolds to create highly electrically conductive ( $1 \text{ S cm}^{-1}$ ) and mechanically stiff (14 MPa) polymer [poly(dimethylsiloxane)] composites with as little as 1 vol% CNT.



## COMMUNICATIONS

3373

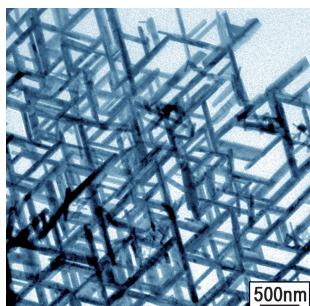
**Reversible phototriggered micromanufacturing using amorphous photoresponsive spirooxazine film**

Takashi Ubukata,\* Shohei Fujii and Yasushi Yokoyama

Surface relief gratings (SRGs) were formed on amorphous films of highly durable spirooxazine molecules by spatially patterned UV light exposure of the films due to mass transfer. SRGs were erased by heating and reformed by illumination with spatially patterned light again. This is the first reversible SRG formation using a photochromic compound other than azobenzene-related compounds.

## PAPERS

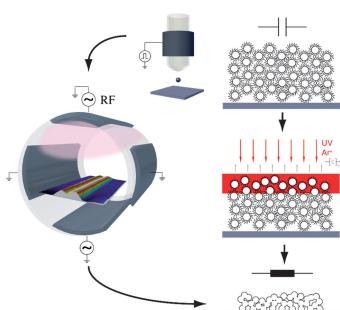
3378

**Tectonic arrangement of  $\text{Bi}_2\text{S}_3$  nanocrystals into 2D networks**

Yu Zhao, Yi Xie,\* Jian-Sheng Jie, Chun-Yan Wu and Si Yan

Two-dimensional bismuth sulfide networks with controlled aspect ratio of building blocks have been fabricated *via* a template/catalyst-free solution route by oriented attachment and natural growth.

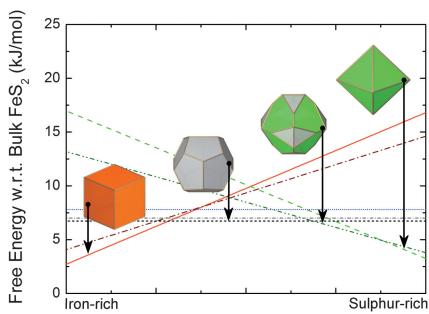
3384

**Argon plasma sintering of inkjet printed silver tracks on polymer substrates**

Ingo Reinhold, Chris E. Hendriks, Rebecca Eckardt, Johannes M. Kranenburg, Jolke Perelaer, Reinhard R. Baumann and Ulrich S. Schubert\*

Argon plasma was used as an alternative and selective sintering technique for inkjet printed silver tracks on common polymer substrates. This resulted in features with a resistivity less than one order of magnitude higher than the bulk silver value in less than 60 minutes without affecting the substrate.

3389

**Modelling nanoscale  $\text{FeS}_2$  formation in sulfur rich conditions**

A. S. Barnard\* and S. P. Russo

The formation of single monodispersed nanocrystals of pyrite is usually associated with sulfide-rich conditions. We study the roles of sulfur concentration and temperature in moderating particle morphology. Shape may be indicative of the S concentration present during formation, and offer a viable route for tailoring the nanomorphology during synthesis.

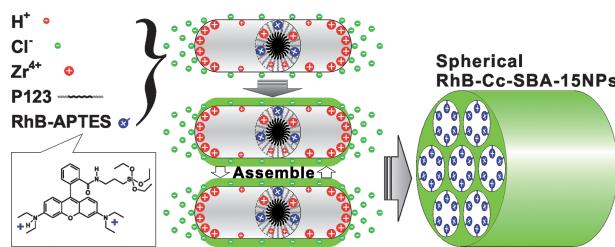
## PAPERS

3395

**Rhodamine B-co-condensed spherical SBA-15 nanoparticles: facile co-condensation synthesis and excellent fluorescence features**

Qianjun He, Jianlin Shi,\* Xiangzhi Cui, Jinjin Zhao, Yu Chen and Jian Zhou

Spherical SBA-15 fluorescent nanoparticles with large doping amounts of covalently bound and monodisperse rhodamine B within mesoporous channels exhibit excellent fluorescence features which are favored for medical diagnosis and synchronous therapy.

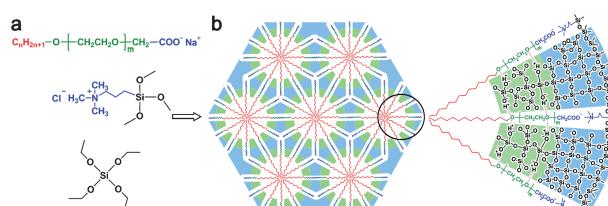


3404

**Molecular design of AEC tri-block anionic surfactant towards rational synthesis of targeted thick-walled mesoporous silica**

Runhuan Gong, Lu Han, Chuanbo Gao, Mouhai Shu and Shunai Che\*

A successful design of tri-block AEC surfactant with two types of hydrophilic head groups leads to a targeted thick-walled mesoporous silica. It provides a novel strategy for controlling the properties of the porous materials.

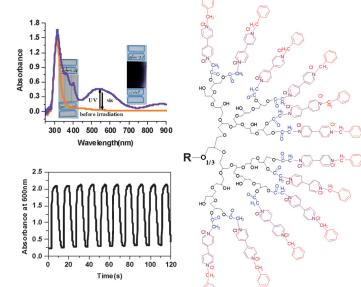


3412


**Hyperbranched and viologen-functionalized polyglycerols: preparation, photo- and electrochromic performance**

Liang-cheng Cao, Miao Mou and Yuechuan Wang\*

Hyperbranched and viologen functionalized polyether, prepared by covalently bonding viologen chromophores to the chain-ends of hyperbranched polyglycerol, exhibits both photo- and electrochromism with high color contrast, short response time, and excellent stability.

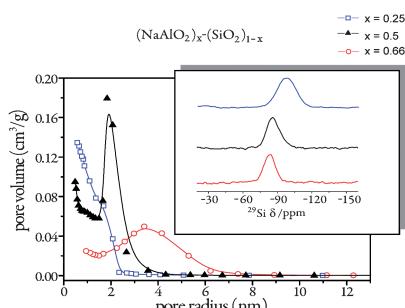


3419


**Sol-gel preparation of mesoporous sodium aluminosilicate glasses: mechanistic and structural investigations by solid state nuclear magnetic resonance**

Rashmi R. Deshpande and Hellmut Eckert\*

A new sol-gel route to mesoporous  $(\text{NaAlO}_2)_x(\text{SiO}_2)_{1-x}$  glasses that are structurally similar to the analogous glasses prepared via melt-cooling.





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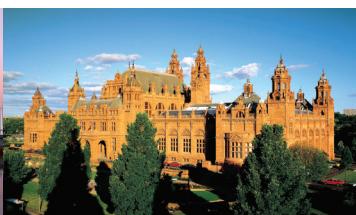
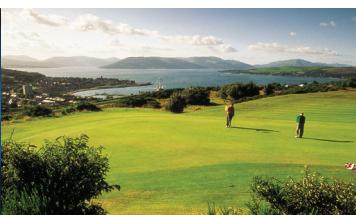
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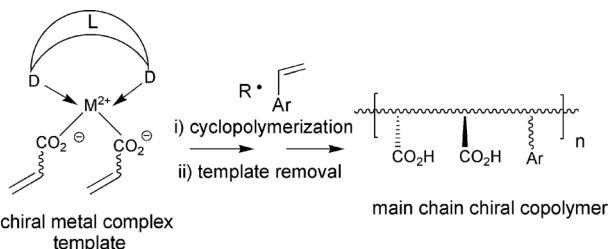
3427



## Synthesis of main chain chiral methacrylate copolymers via chirality transfer from polymerizable chiral metal complexes

Satyasankar Jana,\* Peter A. G. Cormack, Alan R. Kennedy and David C. Sherrington\*

Free radical copolymerization of (−)-sparteine Zn(II) (meth)acrylates with vinyl arenes, and cleavage of the chiral template, results in chirality transfer to the backbones of so-formed (meth)acrylic acid–vinyl arene copolymers.



3443



## Amphiphilic mesoporous silica composite nanosheets

Shujiang Ding, Bing Liu, Chengliang Zhang, Ying Wu, Huifang Xu, Xiaozhong Qu,\* Jiguang Liu and Zhenzhong Yang\*

Amphiphilic mesoporous silica nanosheets are prepared by milling the corresponding hollow spheres, which are served as particulate emulsifiers and also can assist other functional materials to be dispersible.



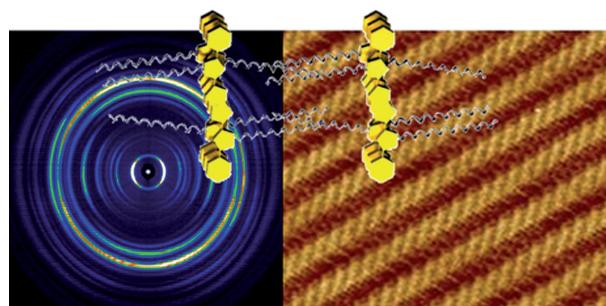
3449



## Thieno[3,2-*b*]thiophene oligomers and their applications as p-type organic semiconductors

Moawia O. Ahmed, Chunmei Wang, Peisi Keg, Wojciech Pisula, Yeng-Meng Lam, Beng S. Ong, Siu-Choon Ng, Zhi-Kuan Chen\* and Subodh G. Mhaisalkar\*

Solution processed top-contact OTFTs with mobilities as high as  $0.03 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$  were measured with a new molecular design for small molecules based on a thieno[3,2-*b*]thiophene. The promising mobilities coupled with air and thermal stability, make these materials promising candidates for future OTFTs applications.



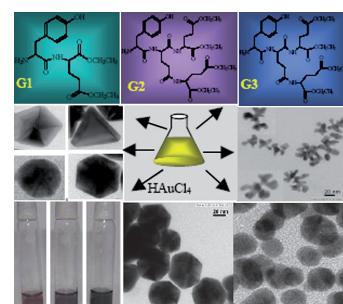
3457



## Synthesis of multiple shaped gold nanoparticles using wet chemical method by different dendritic peptides at room temperature

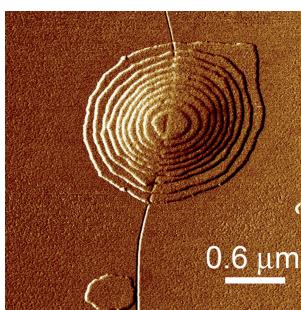
Goutam Palui, Sudipta Ray and Arindam Banerjee\*

Various anisotropic gold nanoparticles were prepared using different generations of peptidic dendrons at room temperature and pH 11 in water-methanol (4:1) without adding any external reducing or stabilizing agents.



## PAPERS

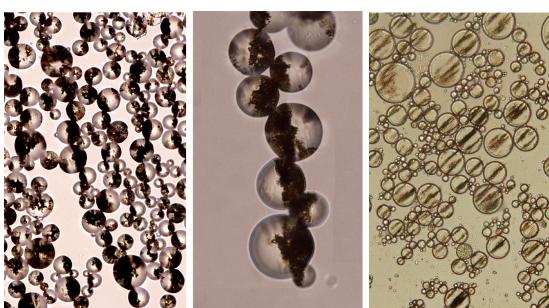
3469

**A layered liquid crystalline droplet**

Yan-Li Zhao, Natalia Erina, Takuma Yasuda,  
Takashi Kato\* and J. Fraser Stoddart\*

A liquid crystal compound, which contains cholesterol, tetrathiafulvalene, and 1,5-dioxynaphthalene moieties, self-organizes to form layered droplet superstructures on mica substrates which exhibit dynamic spreading behavior.

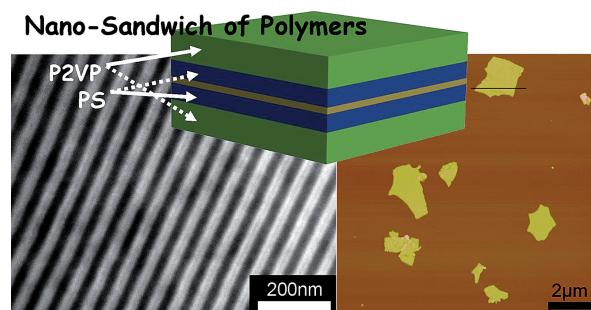
3475

**Fabrication of novel anisotropic magnetic microparticles**

Amro K. F. Dyab, Mustafa Ozmen, Mustafa Ersoz  
and Vesselin N. Paunov\*

We have developed a novel method for fabricating anisotropic magnetic microparticles with permanent magnetic dipole moments and various morphologies. The method is based on "arresting" the alignment and the magnetic polarization of hydrophobised magnetite nanoparticles dispersed into oil-in-water emulsion drops by polymerising the oil phase in an external magnetic field.

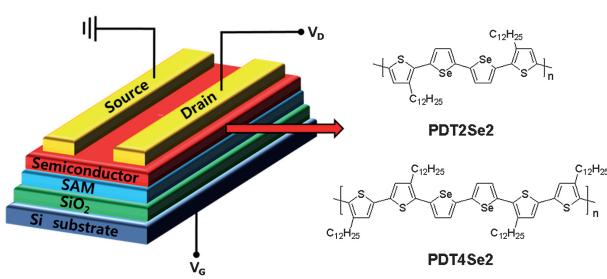
3482

**Functional sandwich-like organic/inorganic nanoplates from gelable triblock terpolymers**

Ke Zhang, Lei Gao, Cheng Zhang and Yongming Chen\*

Organic/inorganic hybrid nanoplates with a crosslinked layer sandwiched by block copolymer layers were prepared from self-gelable triblock terpolymer and their functions, such as pH sensitivity and metal nanoparticle stabilization, were also explored.

3490

**New selenophene-based semiconducting copolymers for high performance organic thin-film transistors**

Hoyoul Kong, Dae Sung Chung, In-Nam Kang,  
Jong-Hwa Park, Moo-Jin Park, In Hwan Jung,  
Chan Eon Park\* and Hong-Ku Shim\*

A series of new selenophene-based organic semiconducting copolymers were synthesized by Stille and oxidative coupling reactions, one of them, poly(5,5'-bis(3-dodecylthiophen-2-yl)-2,2'-biseLENOPHENE), exhibiting a mobility of  $0.02 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$  due to its excellent intermolecular ordering.

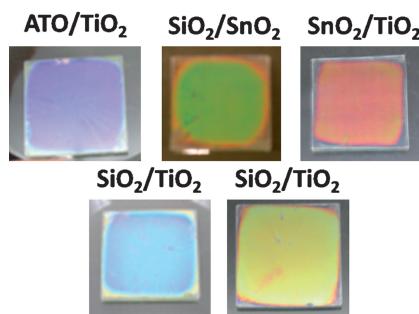
## PAPERS

3500

**Color from colorless nanomaterials: Bragg reflectors made of nanoparticles**

Daniel P. Puzzo, Leonardo D. Bonifacio, John Oreopoulos, Christopher M. Yip, Ian Manners\* and Geoffrey A. Ozin\*

We report herein on a facile and reproducible approach to prepare mesoporous nanoparticle-based distributed Bragg reflectors (DBRs) from a diverse group of metal oxide nanoparticles including  $\text{SiO}_2$ ,  $\text{TiO}_2$ ,  $\text{SnO}_2$ , and  $\text{Sb:SnO}_2$ . The films prepared, regardless of the composition, and following dispersion and process engineering, demonstrate uniform color and high optical quality over large areas.

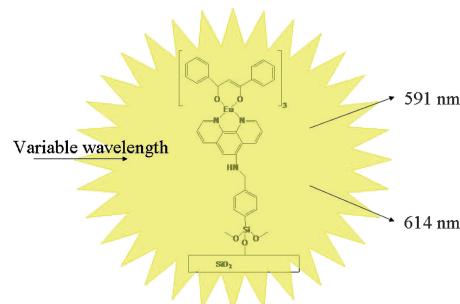


3507

**Tunable luminescent properties of a europium complex monolayer**

Antonino Gulino,\* Fabio Lupo, Guglielmo G. Condorelli, Alessandro Motta and Ignazio L. Fragalà

Silica substrates were functionalized with a covalent phenanthroline-based europium(III) complex monolayer. A tunable luminescent behavior, dependent on the excitation wavelength of the title monolayer has been exploited.

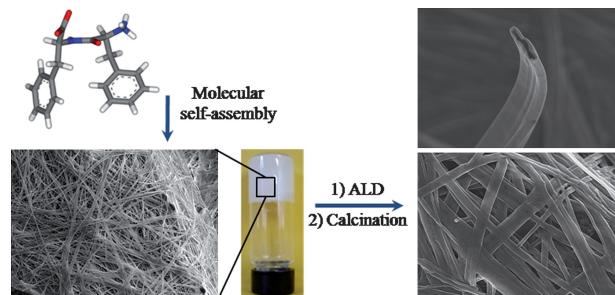


3512

**Highly entangled hollow  $\text{TiO}_2$  nanoribbons templating diphenylalanine assembly**

Tae Hee Han, Jun Kyun Oh, Ji Sun Park, Se-Hun Kwon, Sung-Wook Kim and Sang Ouk Kim\*

Owing to high thermal stability of diphenylalanine assembly, a nanoscale layer of  $\text{TiO}_2$  could be deposited on the surface of the xerogel framework assembled from diphenylalanine *via* an atomic layer deposition process. After the calcination of the peptide framework, highly entangled hollow  $\text{TiO}_2$  nanoribbons were successfully created.

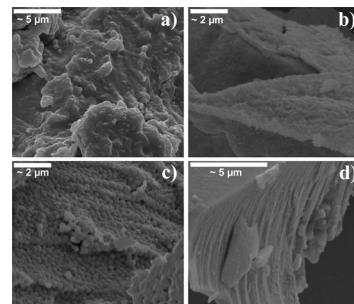


3517

**The production of nanoparticulate ceria using reverse micelle sol gel techniques**

Sian Masson,\* Peter Holliman, Maher Kalaji and Petr Kluson

Mesoporous ceria nanoparticles have been synthesized from cerium isopropoxide as precursor in a sol gel type process by controlled hydrolysis using reverse micelles. The data emphasise the importance of calcination temperature and an oxidizing atmosphere in the creation of mesoporosity and nano-sized particles.

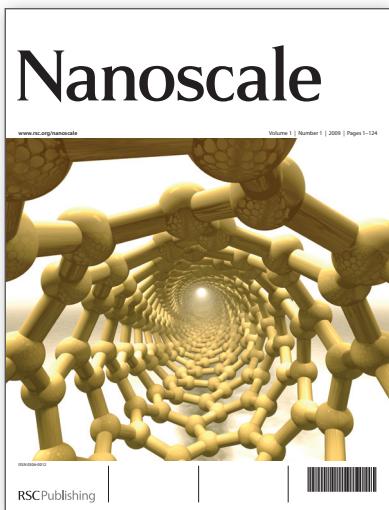


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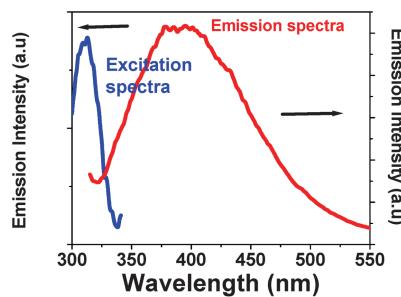
## PAPERS

3523


**Efficient luminescence and photocatalytic behaviour in ultrafine  $\text{TiO}_2$  particles synthesized by arrested precipitation**

Sreejith Kaniyankandy and Hirendra N. Ghosh\*

The fast synthesis of ultrasmall  $\text{TiO}_2$  in TOPO and benzophenone as the solvents is demonstrated; ultrasmall  $\text{TiO}_2$  exhibits increased photocatalytic activity compared to normal  $\text{TiO}_2$  (anatase) and commercial  $\text{TiO}_2$  (P-25).

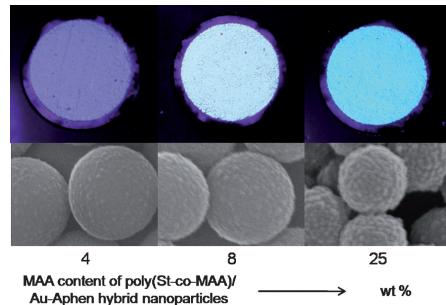


3529


**Tunable fluorescent poly(styrene-co-methacrylic acid)/Au-Aphen hybrid nanoparticles via surface immobilization**

Patakamuri Govindaiah, Jung Min Lee, Yeon Jae Jung, Sun Jong Lee and Jung Hyun Kim\*

The luminescent properties of hybrid nanoparticles can be controlled by changing the amount of 5-amino-1, 10-phenanthroline functionalized gold nanoparticles on poly(styrene-co-methacrylic acid) particles surface.

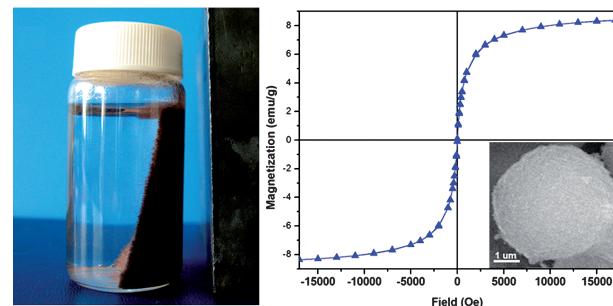


3538


**In situ synthesis of  $\text{Fe}_3\text{O}_4$ /cellulose microspheres with magnetic-induced protein delivery**

Xiaogang Luo, Shilin Liu, Jinping Zhou and Lina Zhang\*

Novel magnetic cellulose microspheres (MRCS) were fabricated by in situ synthesis of  $\text{Fe}_3\text{O}_4$  nanoparticles in cellulose pores as reaction micro-chambers. The MRCS exhibited sensitive magnetic-induced transference, an extremely small hysteresis loop and good adsorption and release capabilities for bovine serum albumin.

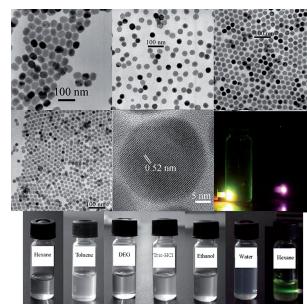


3546

**Monodisperse, size-tunable and highly efficient  $\beta\text{-NaYF}_4\text{:Yb,Er(Tm)}$  up-conversion luminescent nanospheres: controllable synthesis and their surface modifications**

Chenghui Liu, Hui Wang, Xiao Li and Depu Chen\*

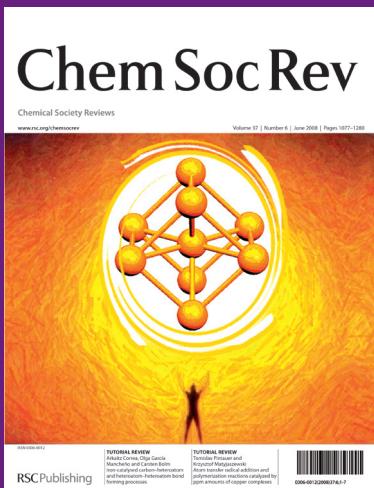
Uniform  $\beta\text{-NaYF}_4\text{:Yb,Er(Tm)}$  up-conversion luminescent nanospheres have been successfully prepared. The ultrahigh up-conversion luminescence, small sizes and good solubility in various media of the as-synthesized  $\beta\text{-NaYF}_4\text{:Yb,Er(Tm)}$  NPs make them rather promising in biological applications.



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