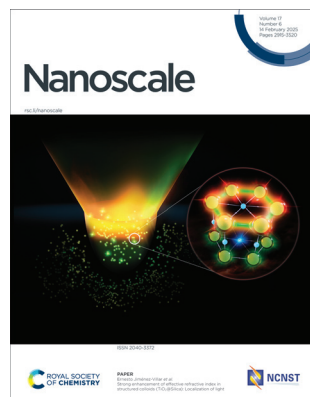


## IN THIS ISSUE

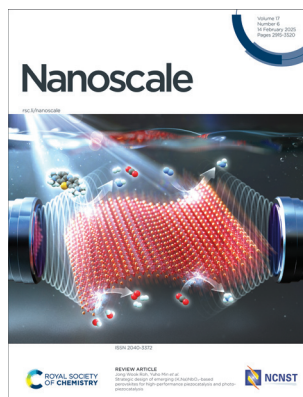
ISSN 2040-3372 CODEN NANOHL 17(6) 2915–3520 (2025)



### Cover

See Ernesto Jiménez-Villar *et al.*, pp. 3061–3070.

Image reproduced by permission of Ernesto Jiménez-Villar from *Nanoscale*, 2025, **17**, 3061.



### Inside cover

See Jong Wook Roh, Yuho Min *et al.*, pp. 2931–2960.

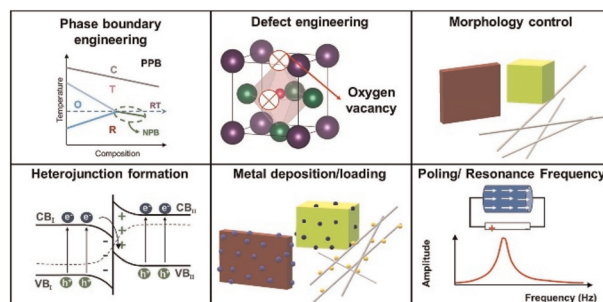
Image reproduced by permission of Yuho Min from *Nanoscale*, 2025, **17**, 2931.

## REVIEWS

2931

### Strategic design of emerging (K,Na)NbO<sub>3</sub>-based perovskites for high-performance piezocatalysis and photo-piezocatalysis

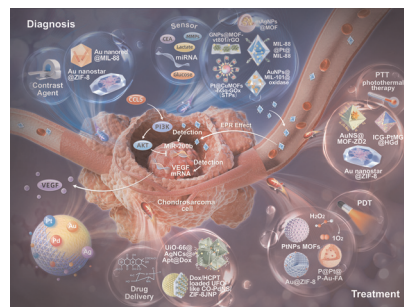
Seonhwa Park, Hui Yong Jeong, Seokhwan Kim, Mahesh Peddigari, Geon-Tae Hwang, Geon Dae Moon, Jong Wook Roh\* and Yuho Min\*



2961

### A promising role of noble metal NPs@MOFs in chondrosarcoma management

Ziheng Huang, Keyue Tian, Yiyuan Xue and Feng Luo\*



# Advance your career in science

with professional recognition that showcases  
your **experience, expertise and dedication**

## Stand out from the crowd

Prove your commitment  
to attaining excellence in  
your field

## Gain the recognition you deserve

Achieve a professional  
qualification that inspires  
confidence and trust

## Unlock your career potential

Apply for our professional  
registers (RSci, RSciTech)  
or chartered status  
(CChem, CSci, CEnv)

## Apply now

[rsc.li/professional-development](https://rsc.li/professional-development)

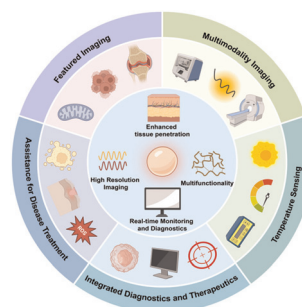


## MINIREVIEWS

2985

## NIR-II upconversion nanomaterials for biomedical applications

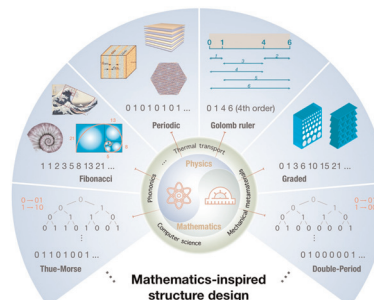
Ranran Luo, Chenxi Zhang, Zening Zhang, Pengchen Ren, Zhongsheng Xu\* and Yun Liu\*



3003

## Mathematically inspired structure design in nanoscale thermal transport

Xin Wu\* and Masahiro Nomura\*

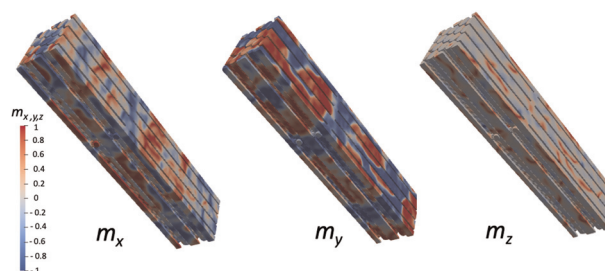


## COMMUNICATIONS

3014

## Magnetoelastic anisotropy drives localized magnetization reversal in 3D nanowire networks

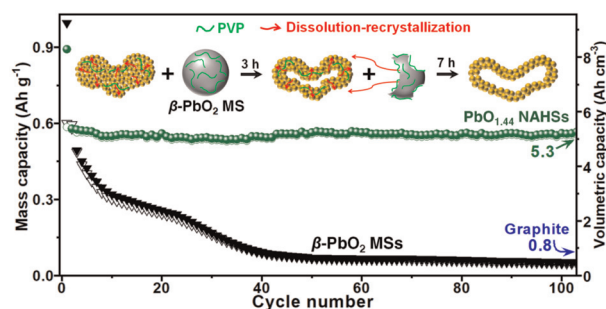
Laura G. Vivas,\* Alejandra Ruiz-Clavijo, Olga Caballero-Calero, David Navas, Amanda A. Ordoñez-Cencerrado, Cristina V. Manzano, Ruy Sanz and Marisol Martín-González\*



3023

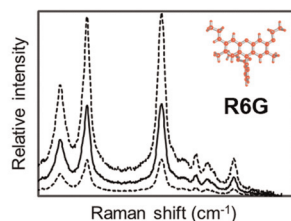
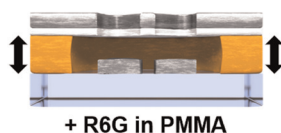
Nanoparticle-assembled interconnected PbO<sub>1.44</sub> hollow spheres enabled by PVP-driven transformation of  $\beta$ -PbO<sub>2</sub> and self-sacrificial templating for superior lithium storage

Xiaoxu Bo,\* Jiatong Zhang, Qian Zhang, Ruijie Wu, Sheng Wang, Shiqiang Zhao\* and Shun Wang\*

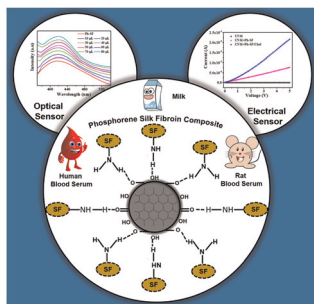


## COMMUNICATIONS

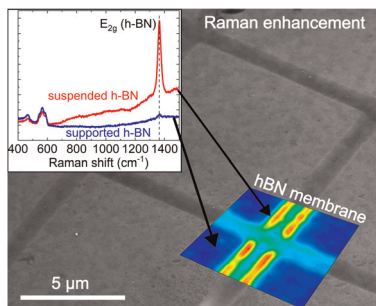
3035

Adjustment of  
interlayer spacingControl of Raman  
enhancementControlling Raman enhancement in particle–  
aperture hybrid nanostructures by interlayer  
spacingKabusure M. Kabusure, Petteri Piskunen,  
Jarkko J. Saarinen, Veikko Linko\* and Tommi K. Hakala\*

3042

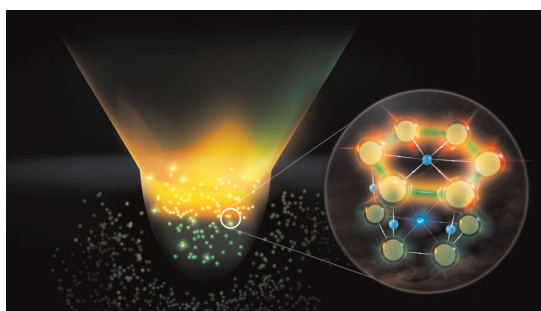
A non-enzymatic dual sensing approach for the  
detection of cholesterol in real samples using silk  
fiber functionalized phosphorene quantum dotsNasrin Sultana, Shreyash Vijay Andagonde,  
Ratul Chakraborty, Asis Bala and Neelotpal Sen Sarma\*

3053

Polarisation-dependent Raman enhancement in  
hexagonal boron nitride membranesJakub Rogoża, Johannes Binder,\* Kirill V. Voronin,  
Iris Niehues, Katarzyna Ludwiczak,  
Aleksandra K. Dąbrowska, Mateusz Tokarczyk,  
Rafał Bożek, Alexey Y. Nikitin, Rainer Hillenbrand,  
Roman Stępniewski and Andrzej Wysmołek

## PAPERS

3061

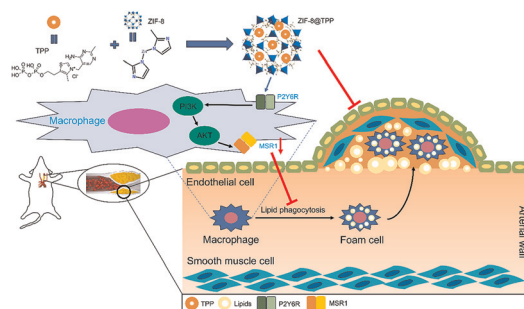
Strong enhancement of effective refractive index in  
structured colloids (TiO<sub>2</sub>@Silica): Localization of  
lightJessica Dipold, Niklaus U. Wetter, Francisco C. Marques,  
Aristide Dogariu and Ernesto Jiménez-Villar\*

## PAPERS

3071

### Metal–organic framework-based nanoplateforms for synergistic anti-atherosclerosis therapy by regulating the PI3K/AKT/MSR1 pathway in macrophages

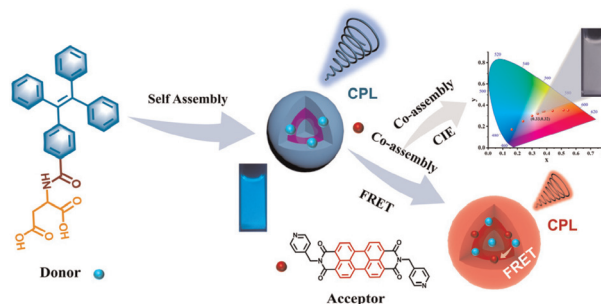
Chenlin Zeng, Zhiyou Peng, Sida Huang, Zhijue Xu, Zhaoxi Peng, Zhaoyu Wu, Jiahao Lei, Xing Zhang, Jinbao Qin, Kaichuang Ye, Bo Li, Zhen Zhao,\* Ying Pan,\* Minyi Yin\* and Xinwu Lu\*



3086

### White circularly polarized luminescence from a dual-component emitter induced by FRET between tetraphenylene and PDI derivatives

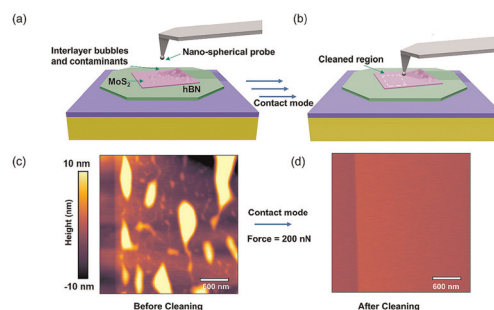
Huanhuan Dong, Huajing Li, Enquan Tian, Yijun Zhang, Jian Kong and Yuanguang Li\*



3095

### Nano-spherical tip-based smoothing with minimal damage for 2D van der Waals heterostructures

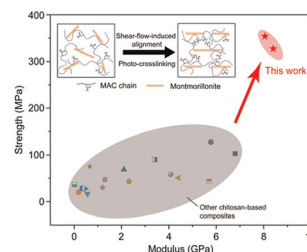
Xiaolei Ding, Boshi Qiao, Paul C. Uzoma, Muhammad Abid Anwar, Yuxuan Chen, Lansheng Zhang, Yang Xu\* and Huan Hu\*



3105

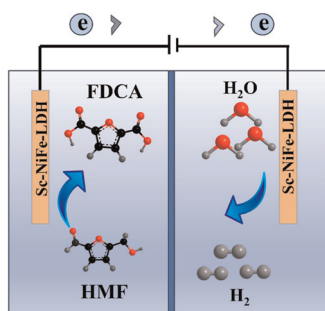
### High strength chitosan-based nanocomposites with aligned nanosheets and crosslinked networks

Xiaodong Yu, Jihao Fan, Shengquan Zheng, Linlin Ma, Xiaojing Liu, Yue Wu, Chuangqi Zhao\* and Lei Jiang



## PAPERS

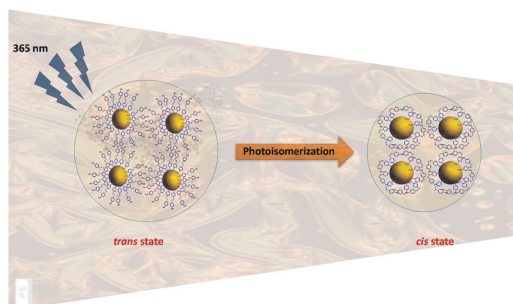
3114



### Construction of an Sc-NiFe-LDH electrocatalyst for highly efficient electrooxidation of 5-hydroxymethylfurfural at industrial current density

Yufeng Wu, Zhiyan Hou and Changlong Wang\*

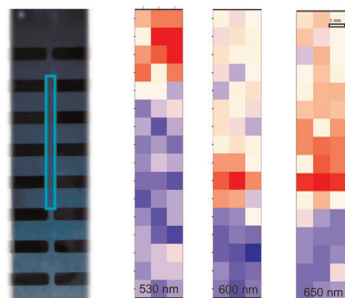
3123



### Tuning the optical properties of gold nanoparticles via photoactive liquid crystalline azo ligands

Sachin Ashok Bhat,\* Shankar Rao, Subbarao Krishna Prasad and Channabasaveshwar Yelamaggad\*

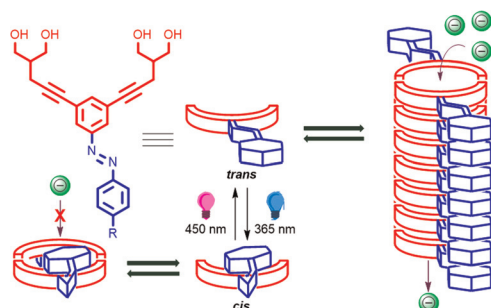
3133



### Film thickness dependence of nanoscale arrangement of a chiral electron donor in its blends with an achiral electron acceptor

Giulia Pancotti, C. Elizabeth Killalea, Thomas W. Rees, Letizia Liirò-Peluso, Sergi Riera-Galindo, Peter H. Beton, Mariano Campoy-Quiles, Giuliano Siligardi and David B. Amabilino\*

3145



### Dynamic regulation of ion transport through a bis(1,3-propanediol)-based channel via allosteric azobenzene photoswitching

Manzoor Ahmad, Susmita Sarkar, Ravindra Bhogade, Abhishek Mondal, Debashis Mondal, Jagannath Mondal and Pinaki Talukdar\*

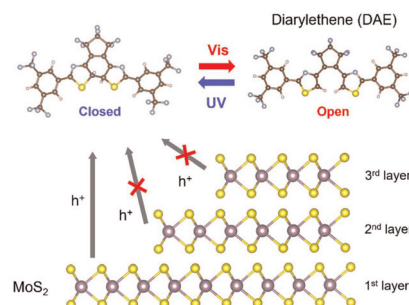


## PAPERS

3152

### Layer-number-dependent photoswitchability in 2D MoS<sub>2</sub>-diarylethene hybrids

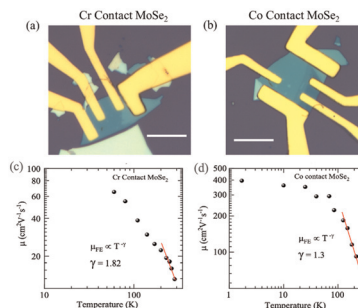
Sewon Park, Jaehoon Ji, Srajan Pillai, Henry Fischer, Jean Rouillon, Carlos Benitez-Martin, Joakim Andréasson, Jeong Ho You and Jong Hyun Choi\*



3160

### Percolative phase transition in few-layered MoSe<sub>2</sub> field-effect transistors using Co and Cr contacts

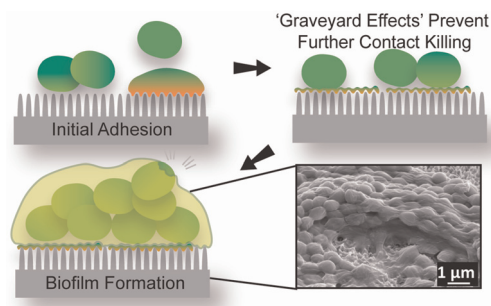
Roshan Padhan, Carlos Garcia, Ralu Divan, Anirudha V. Sumant, Daniel Rosenmann, Sujit A. Kadam, Akshay Wali, Suzanne Miller, Stephen A. McGill\* and Nihar R. Pradhan\*



3170

### Graveyard effects of antimicrobial nanostructured titanium over prolonged exposure to drug resistant bacteria and fungi

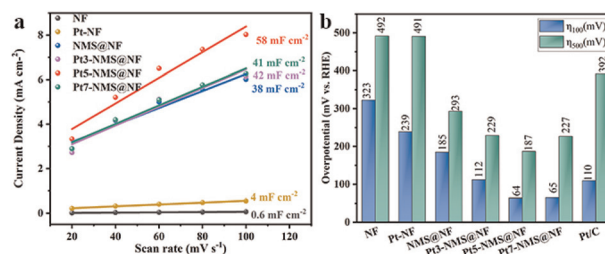
Louisa Z. Y. Huang, Rowan Penman, Rashad Kariuki, Pierre H. A. Vaillant, Soroosh Gharehgozlo, Z. L. Shaw, Vi Khanh Truong, Jitraporn Vongsivut, Aaron Elbourne\* and Rachel A. Caruso\*



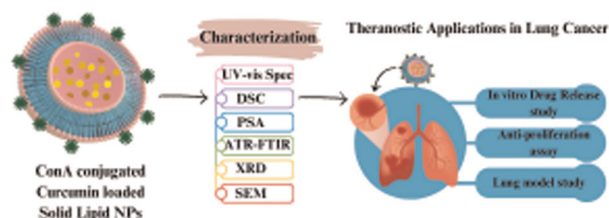
3189

### An efficient hydrogen evolution catalyst constructed using Pt-modified Ni<sub>3</sub>S<sub>2</sub>/MoS<sub>2</sub> with optimized kinetics across the full pH range

Maoyuan Li, Zhongrui Yu, Zulin Sun, Yuchen Liu, Simiao Sha, Jiancheng Li, Riyue Ge, Liming Dai, Bin Liu,\* Qingqiao Fu\* and Wenxian Li\*



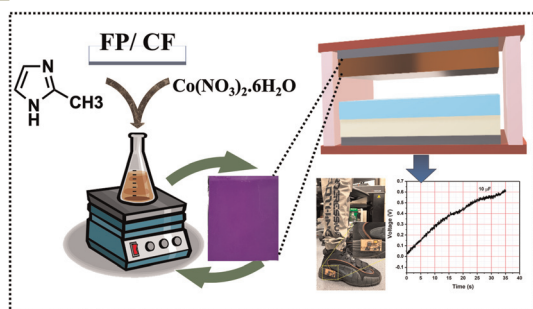
3203



### Fabrication and characterization of ConA-conjugated curcumin-loaded solid lipid nanoparticles for theranostic applications in lung cancer treatment

Vinit Nikwade, Nisha Choudhary, Raghu Solanki, Ashish Patel,\* Virendra Kumar Yadav,\* Saleh H. Salmen, Abdullah A. Alarfaj, Mohammad Javed Ansari and Vivekanand Chatap\*

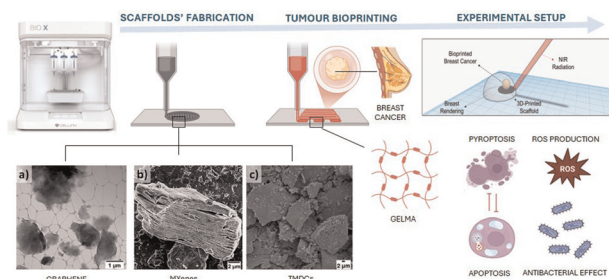
3211



### Growth of the metal-organic framework ZIF-67 on cellulosic substrates for triboelectric nanogenerators

Gaurav Khandelwal,\* Dina Anna John, Venkateswaran Vivekananthan, Nikolaj Gadegaard, Daniel M. Mulvihill\* and Sang-Jae Kim\*

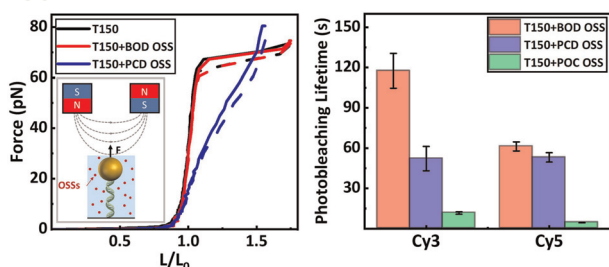
3221



### Impact of different 2D materials on the efficacy of photothermal and photodynamic therapy in 3D-bioprinted breast cancer

Giordano Perini, Antonio Minopoli, Dario Zambrano, Lishan Cui, Valeria Ferrara, Caterina Perfili, Giulia Artemi, Marco De Spirito, Valentina Palmieri,\* Andreas Rosenkranz and Massimiliano Papi\*

3236



### An oxygen-scavenging system without impact on DNA mechanical properties in single-molecule fluorescence experiments

Shang Gao, Jialun Liang, Chuang Tan\* and Jie Ma\*

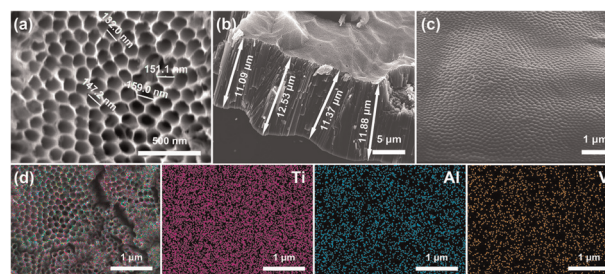


## PAPERS

3243

***In situ* synthesis of an Al and V co-doped TiO<sub>2</sub> NTA interlayer-enhanced PbO<sub>2</sub> composite for efficient zinc electrowinning**

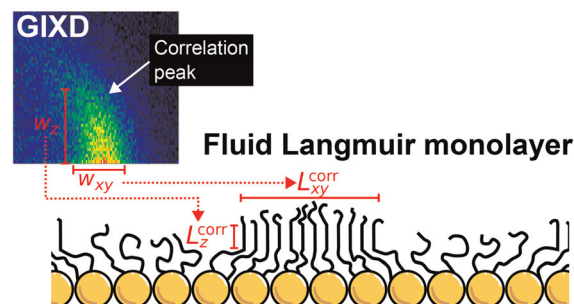
Shengyou Su, Xuanbing Wang, Linjing Yang, Tianyang Liu, Junli Wang\* and Ruidong Xu\*



3257

**Grazing-incidence X-ray diffraction elucidates structural correlations in fluid monolayers of lipids and surfactants**

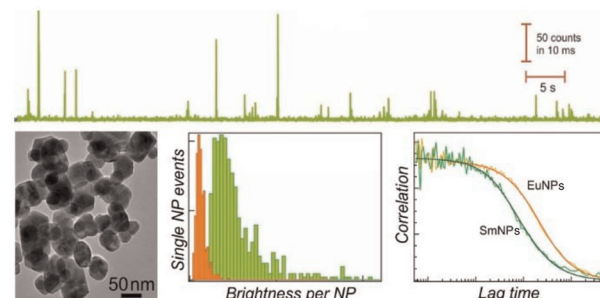
Joshua Reed, Miriam Grava, Chen Shen, Gerald Brezesinski and Emanuel Schneck\*



3270

**Watching lanthanide nanoparticles one at a time: characterization of their photoluminescence dynamics at the single nanoparticle level**

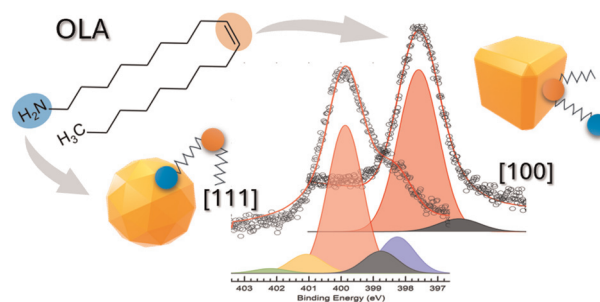
Malavika Kayyil Veedu, Gemma Lavalley, Mohamadou Sy, Joan Goetz, Loïc J. Charbonnière and Jérôme Wenger\*



3277

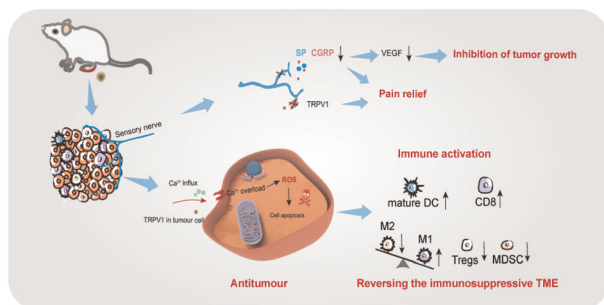
**Versatile role of oleylamine in the controlled synthesis of copper nanoparticles with diverse morphologies**

Sonia Hadaoui, Giang Tran, Ahmed Naitabdi\* and Alexa Courty\*



## PAPERS

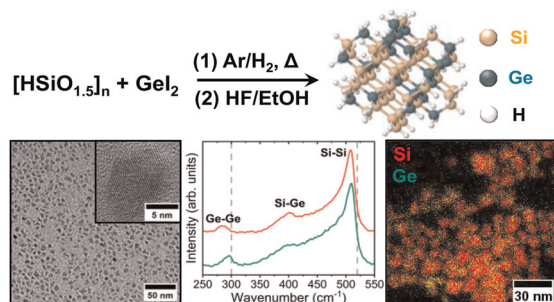
3288



### Capsaicin-induced $\text{Ca}^{2+}$ overload and ablation of TRPV1-expressing axonal terminals for comfortable tumor immunotherapy

Jian Sun, Deqiang Wang, Yiyang Wei, Danyang Wang, Zhengkun Ji, Wanru Sun, Xin Wang, Pingyu Wang, Nicola Paccione Basmadji, Eider Larrarte, José Luis Pedraz, Murugan Ramalingam,\* Shuyang Xie\* and Ranran Wang\*

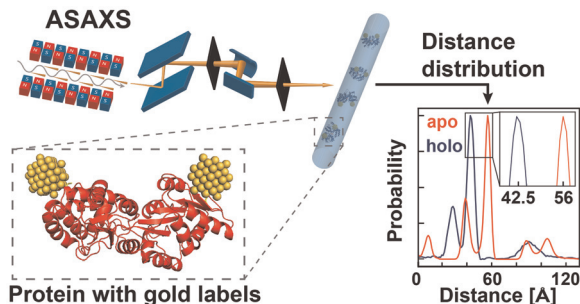
3306



### Solid-state synthesis of $\text{Si}_{1-x}\text{Ge}_x$ nanoalloys with composition-tunable energy gaps and visible to near infrared optical properties

Griffin C. Spence, David S. Pate, Corentin Villot, Roshana M. Fouzie, Lisa S. Graves, Ka Un Lao, Ümit Özgür and Indika U. Arachchige\*

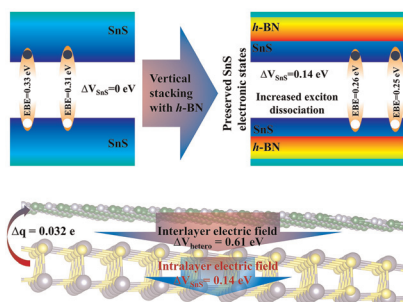
3322



### Determination of absolute intramolecular distances in proteins using anomalous X-ray scattering interferometry

Samuel Stubhan, Anna V. Baptist, Caroline Körösy, Alessandra Narducci, Gustavo Gabriel Moya Muñoz, Nicolas Wendler, Aidin Lak, Michael Sztucki, Thorben Cordes\* and Jan Lipfert\*

3331



### Enhancing the optoelectronic properties of SnS via mixed-phase heterostructure engineering

Dhanjit Talukdar,\* Dambarudhar Mohanta and Gazi A. Ahmed

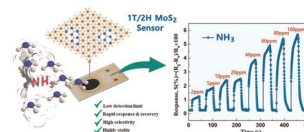


## PAPERS

3341

### Harnessing mixed-phase MoS<sub>2</sub> for efficient room-temperature ammonia sensing

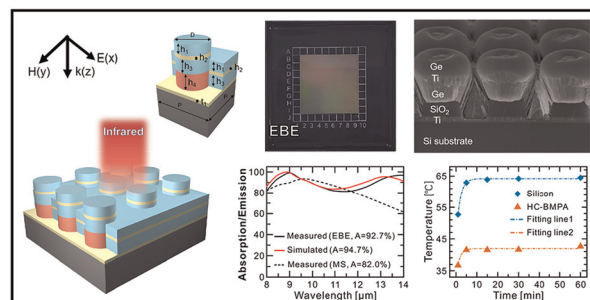
M. A. Jalil, Kamrul Hassan, Anh Tuan Trong Tran, Tran Thanh Tung, Manas Ranjan Panda, Sally El Meragawi, Tetsuya Kida, Mainak Majumder and Dusan Losic\*



3353

### Long-wavelength infrared metamaterial absorber with polarization and angle insensitivity using compact hybrid cylindrical structures

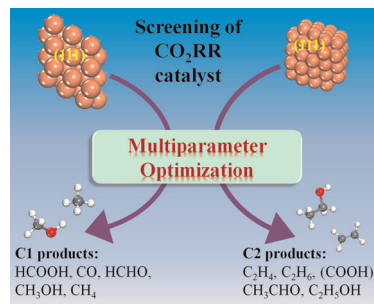
Wenqian Zhang, Youxin Chen,\* Jiang Wei, Yan Miao, Qingkang Wang and Kaiyu Wu



3360

### Size-, shape-, facet- and support-dependent selectivity of Cu nanoparticles in CO<sub>2</sub> reduction through multiparameter optimization

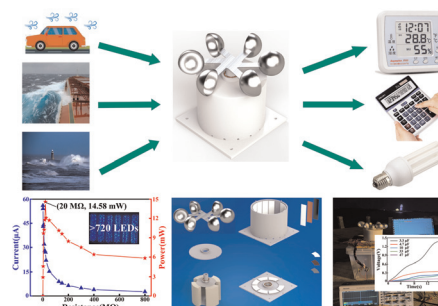
Anjana Tripathi and Ranjit Thapa\*



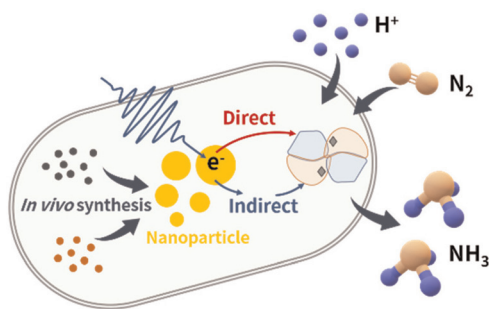
3370

### A roller-type triboelectric nanogenerator based on rotational friction between wool and stacked interfaces for omnidirectional wind energy harvesting

Xiaonan Su, Yuxiang Su,\* Hongjun Yan,\* Xinyao Zhang, Guanyu Dai, Xin Dong, Jinlin Wu, Xizeng Zhao, Keyang Zhao and Zhenhua Li\*



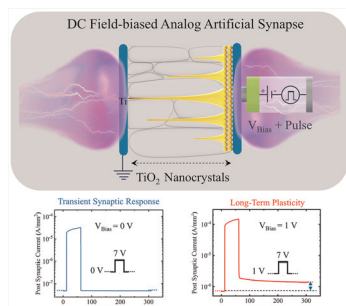
3381



### *In vivo* synthesis of semiconductor nanoparticles in *Azotobacter vinelandii* for light-driven ammonia production

Gui-Min Kim, Yoojin Choi, Kyeong Rok Choi, Ilsong Lee, Jayeong Kim, Byunghyun Lee, Sang Yup Lee\* and Doh C. Lee\*

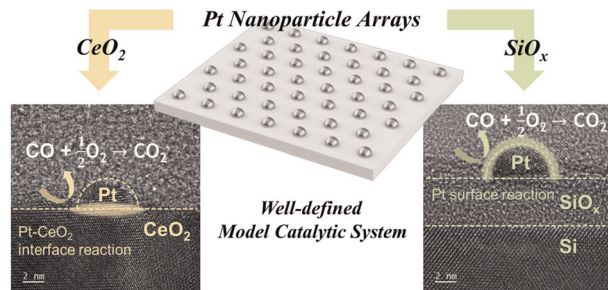
3389



### DC field-biased multibit/analog artificial synapse featuring an additional degree of freedom for performance tuning

Milad Jabri and Faramarz Hossein-Babaei\*

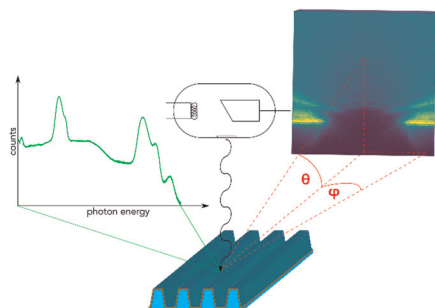
3402



### Monodisperse Pt nanoparticle arrays *via* block copolymer nanopatterning and their reaction kinetics on CO oxidation

Geon Gug Yang, Hyeong Min Jin, Minsu Park, Minha Kim, Dong-Wook Shin, Sang Ouk Kim,\* WooChul Jung\* and Siwon Lee\*

3411



### Investigation of Ti nanostructures *via* laboratory scanning-free GEXRF

Steffen Staeck,\* Jonas Baumann, Philipp Hönicke, Nils Wauschkuhn, Ferdinand Spikermann, Daniel Grötzsch, Holger Stiel and Birgit Kanngießer

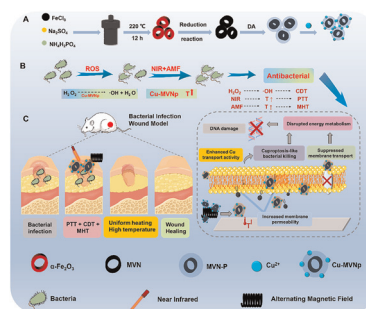


## PAPERS

3421

### Copper doped magnetic vortex nanoring based nanotherapeutics for bacterial infection tri-therapy: interplay of magnetic hyperthermia, chemodynamic therapy and photothermal therapy

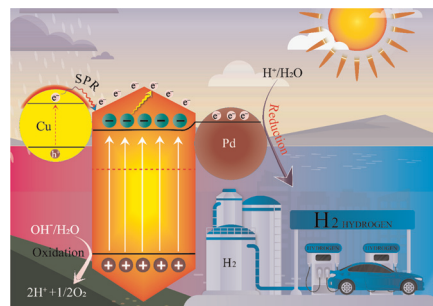
Jing Wang,\* Wenqian Zhao,\* Hui Tu, Xiangyang Zu, Jinghua Li, Kun Lei, Jing Li, Yuchuan Zhuang, Yanbo Dong, Andrey Tulupov, Fengshou Zhang\* and Jianfeng Bao\*



3436

### Unveiling the potential of Cu–Pd/CdS catalysts to supply and rectify electron transfer for H<sub>2</sub> generation from water splitting

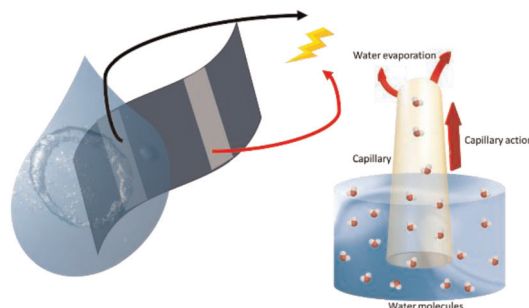
Ejaz Hussain,\* Mamoona Idrees, Muhammad Jalil, Muhammad Zeeshan Abid, Khalid Aljohani and Khezina Rafiq\*



3451

### Can structure influence hydrovoltaic energy generation? Insights from the metallic 1T' and semiconducting 2H phases of MoS<sub>2</sub>

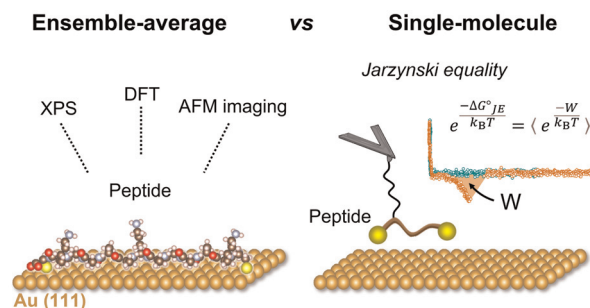
Kaushik Suvigya, Saini Lalita, Siva Nemala Sankar, Andrea Capasso, Li-Hsien Yeh and Kalon Gopinadhan\*



3460

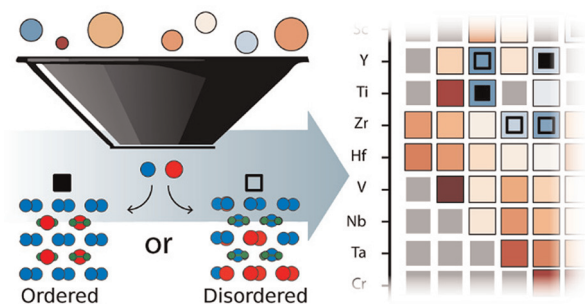
### Binding mechanism of oligopeptides on solid surface: assessing the significance of single-molecule approach

Joanne Lê-Chesnais, Marie Steffenhagen, Christophe Méthivier, Dominique Costa, Daniela Rodriguez, Jean-François Lambert,\* Emmanuel Maisonhaute\* and Jessem Landoulsi\*



## PAPERS

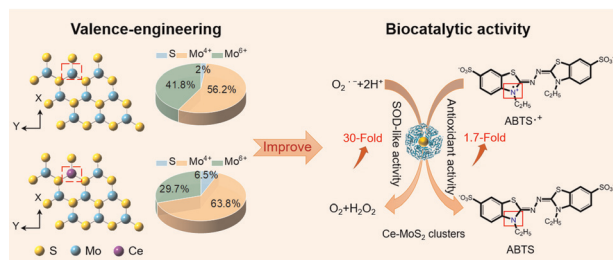
3478



### Computational exploration of M-sites with chemical order and disorder in $M'_2M''B_2$ and $M'_4M''B_3$ compounds

Adam Carlsson, Rodrigo Mantovani Ronchi, Johanna Rosen and Martin Dahlqvist\*

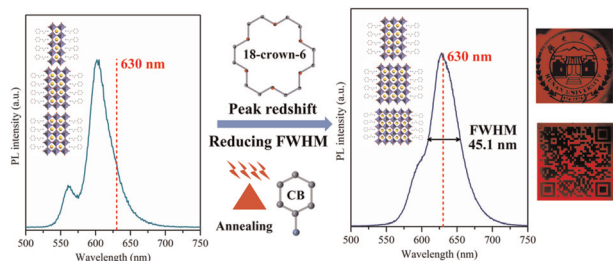
3487



### Valence-engineering modulation of $MoS_2$ clusters for enhancing biocatalytic activity

Xiaoyan Xue, Meili Guo,\* Hao Zhang, Qingshan Liu, Xuyan Li, Xin Sun, Xiaoyu Mu\* and Xiao-Dong Zhang\*

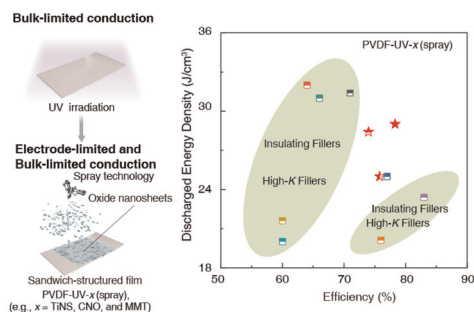
3498



### Pure red emission with spectral stability in full iodine-based quasi-2D perovskite films by controlling phase distribution

Zhiqiang Ming, Siyao Li, Xinyi Luo, Siman Liu, Danliang Zhang, Xiaoli Zhu, Anlian Pan and Xiao Wang\*

3507



### Interface engineering of 2D dielectric nanosheets for boosting energy storage performance of polyvinylidene fluoride-based nanocomposites with high charge-discharge efficiency

Hexing Liu, Jian Wang, Yunfan Wang, Zhonghui Shen, Xin Zhang and Bao-Wen Li\*

