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Nanoscale

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IN THIS ISSUE

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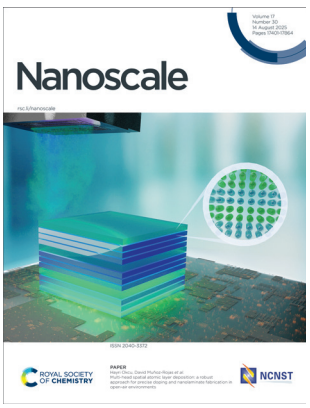

Cover
See Hayri Okcu, David Muñoz-Rojas *et al.*, pp. 17544–17558.

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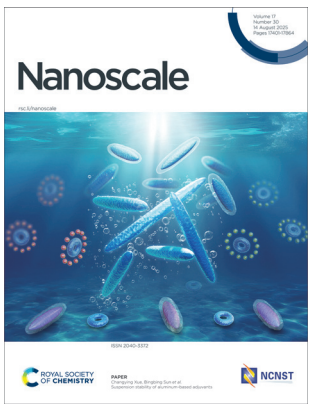

Inside cover
See Changying Xue, Bingbing Sun *et al.*, pp. 17559–17567.

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EDITORIAL

17414

Introduction to the *Nanoscale* and *Nanoscale Advances* joint themed collection: Synthesis, physical properties and applications of advanced nanocrystalline materials

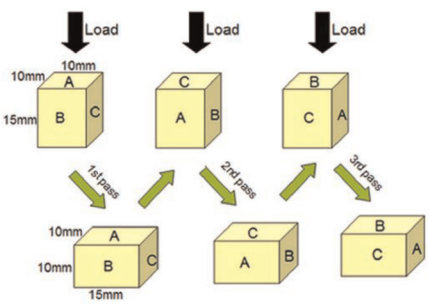
Aurora Rizzo, Ermelinda M. S. Maçôas, Tayebeh Ameri, Renjie Chen and Raghvendra Singh Yadav*

REVIEWS

17417

Recent advances in using severe plastic deformation for the processing of nanomaterials

Terence G. Langdon



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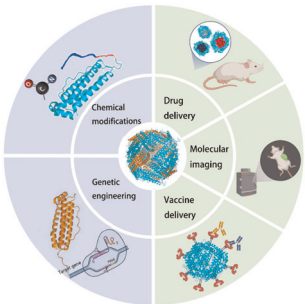
REVIEWS

17428

Structural modification strategies for ferritin nanoparticles and their applications in biomedicine: a narrative review

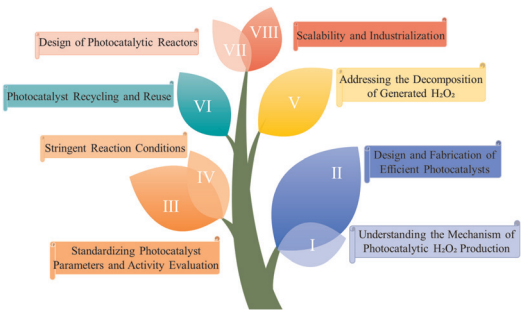
Yinxin Wang, Lei Shi, Chengzhi Zou, Zizhong Liu* and Jia Wang*



17443

Photocatalytic synthesis of hydrogen peroxide: recent advances, challenges, and future perspectives

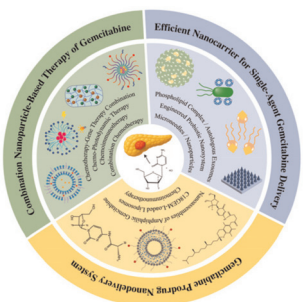
Yayang Wang, Ting Xu, Zhongxing Zhang, Yaowen Wang, Jiming Huang, Ping Xue, Mi Tang,* Lingjun Kong* and Zhengbang Wang*



17480

Recent progress in gemcitabine-loaded nanoparticles for pancreatic cancer therapy: a review

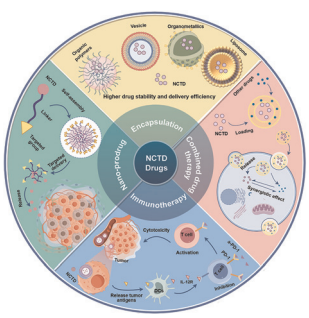
Zhaokai Li, Ruobei Shu, Meichai Li, Xinyv Wang, Xinmei Chen, Hang Chen, Xin Wu* and Jianping Chen*



17508

Research progress of norcantharidin nanodrugs for tumor treatment

Zhi-Yu Xia, Hao-Liang Peng, Yong You, Lu Zhang, Qiu-Ying Deng, Lei Zhou, Si-Lin Chen, Xin-Yi Guo, Jing-Xing Guo* and Dong-Bing Cheng*



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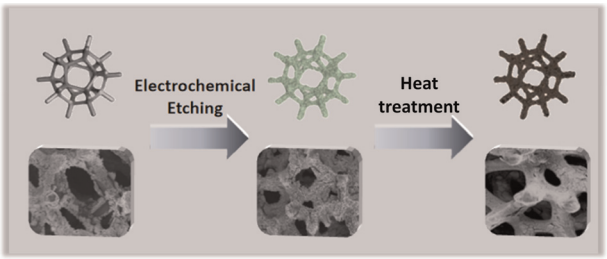
COMMUNICATIONS

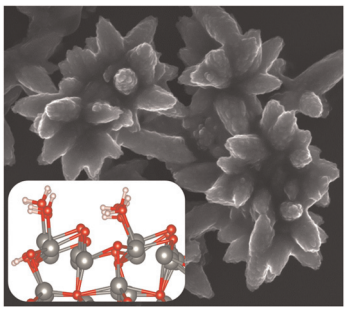
17529



Molybdenum *in situ* etching-treated ultrathin NiFeMo LDHs nanosheet arrays as a performance anodic catalyst for efficient industrial production of hydrogen

Zhiqun Bai, Ruoxuan Guo, Jingwang Kuang, Huifang Chen, WeiHao Sha, Ao Xie, Jingchao Liu,* Pingyu Wan and Yang Tang*

17537



Solvation directed morphological control in metal oxide nanostructures

Duo Song, Lili Liu, Andrew Ritchhart and Maria L. Sushko*

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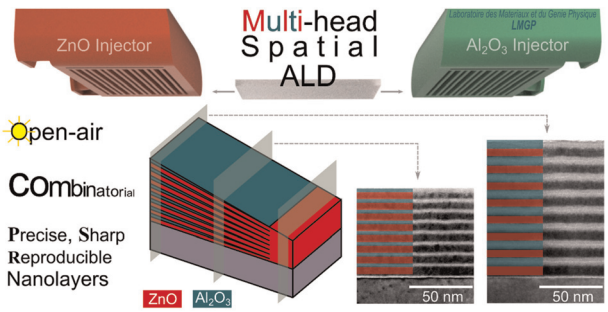
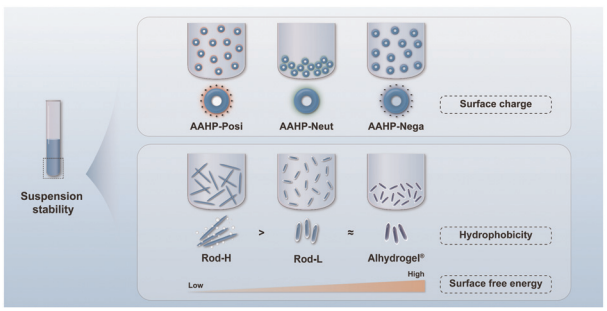
17544



Multi-head spatial atomic layer deposition: a robust approach for precise doping and nanolaminate fabrication in open-air environments

Hayri Okcu,* Martin Ignacio Broens, Vijaya Shanthi Paul Raj, Pia Javiera Vasquez Rivera, Gustavo Ardila and David Muñoz-Rojas*

17559



Suspension stability of aluminum-based adjuvants

Zhihui Liang, Hongyang Gao, Qian Ren, Xin Li, Yubin Ma, Changying Xue* and Bingbing Sun*

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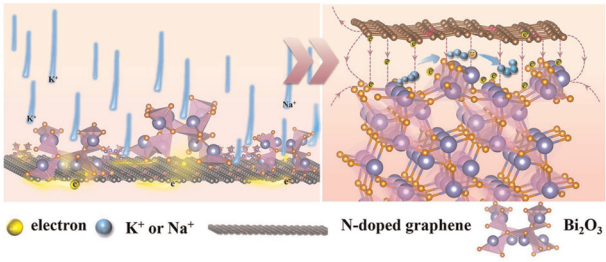
Interface-engineered Bi_2O_3/N-doped carbon heterostructure enabling synergistic effects for advanced energy storage

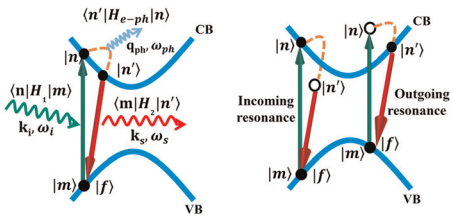
Yuan Wang, Zhongtao Shang, Tao Zhang, Chen Wu, Yiyang Dai and Shaojun Yuan*



17579

Tunable resonant Raman scattering with temperature in vertically aligned 2H-SnS_2

Atul G. Chakkar,* Deepu Kumar, Ashok Kumar, Mahesh Kumar and Pradeep Kumar*

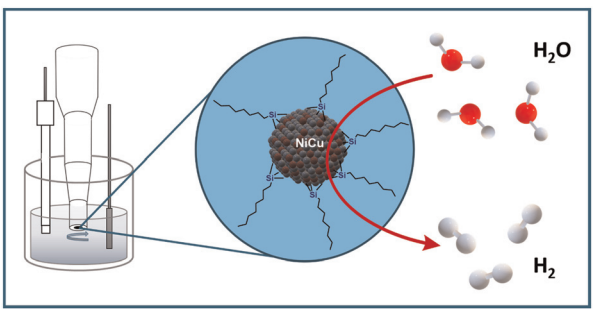


$$I = \left| \sum_{m,n,n'} \frac{\langle m|H_2|n'\rangle\langle n'|H_{el-ph}|n\rangle\langle n|H_1|m\rangle}{(E_L - \Delta E_{mn})(E_s - \Delta E_{mn'})} \right|^2$$

17592

Nanoscale NiCu electrocatalyst for the hydrogen evolution reaction

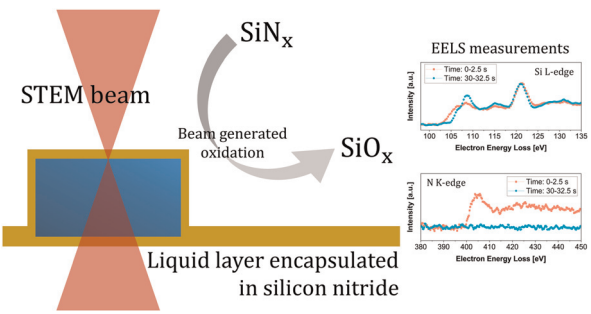
Tatiana Straistari, Nuria Romero, Jérôme Esvan, Marcos Gil-Sepulcre, Catherine Amiens, Olaf Rüdiger, Serena DeBeer, Sara Cavaliere and Karine Philippot*



17604

Electron beam oxidation of silicon nitride membranes in liquid phase transmission electron microscopy

Sofie Tidemand-Lichtenberg, Shima Kadkhodazadeh and Kristian Speranza Mølhave*



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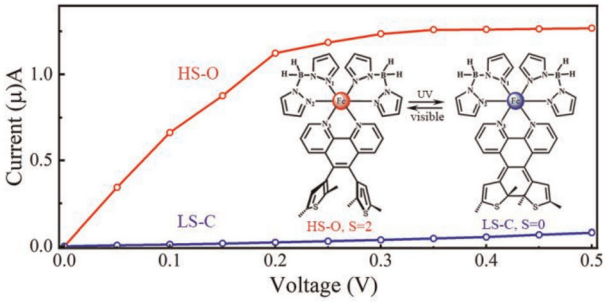
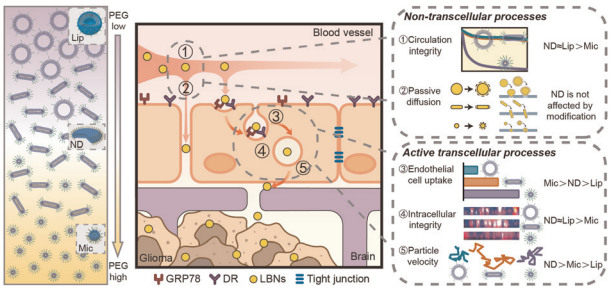


Robust spin-filtering and current-switching in a photochromic Fe(II) spin-crossover complex

Jing Huang, Yiting Zhuo, Mingdi Yang,* Weiyi Wang* and Qunxiang Li*

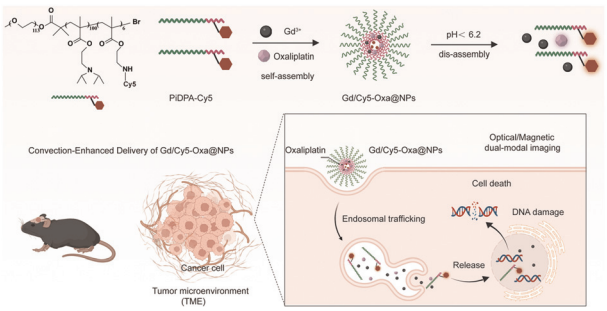
17621



Quantitative to qualitative transition: comparison of *in vitro* and *in vivo* behavior and glioma-targeted delivery of PEGylated lipid-based nanoparticles

Yuan Ding, Yanning Bao, Shengmin Yang, Jianfen Zhou, Jiasheng Lu, Nana Meng, Zhixuan Jiang, Xudong Zheng, Ruohan Chen, Yu Liu, Cao Xie, Linwei Lu* and Weiyue Lu*

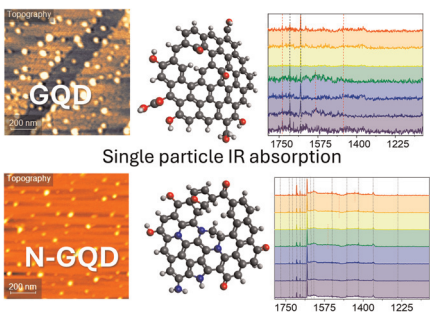
17636



An optical/magnetic imaging nanoplatform-mediated convection-enhanced delivery of oxaliplatin for glioma treatment

Qingyuan He, Shiming Zhang, Yang Wang, Yajuan Gao* and Hongbin Han*

17647



Unravelling chemical heterogeneity and dual emission pathways in graphene quantum dots *via* single-particle infrared spectroscopy

Subhro Kundu, Abu Bakar Siddique, Irvin Fernando Guzmán González, Kevin Armando Rodríguez Mireles, Maritza Iveth Pérez Valverde, Nicolás Antonio Ulloa Castillo, Madhusoodanan Reghunathan, Domingo Ixcoatl García Gutiérrez, Eduardo Martínez Guerra and Mallar Ray*

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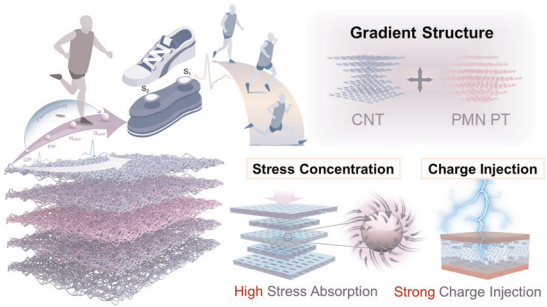
Gradient CNT/PMN-PT/PVDF piezoelectric composites for gait monitoring during weight-bearing walking

Weili Deng,* Tingting Zhou, Wanghong Zeng, Zihan Wang, Yiheng Liu, Boling Lan, Shenglong Wang, Yong Ao, Yue Sun, Shuai Wang, Zhaoyu Li, Long Jin and Weiqing Yang



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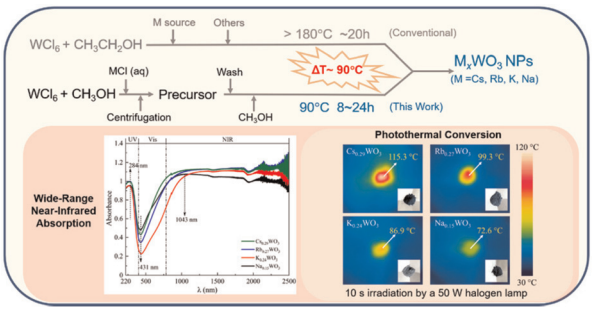
Synthesis of hexagonal tungsten bronze nanoparticles at a significantly lower temperature and in a shorter time

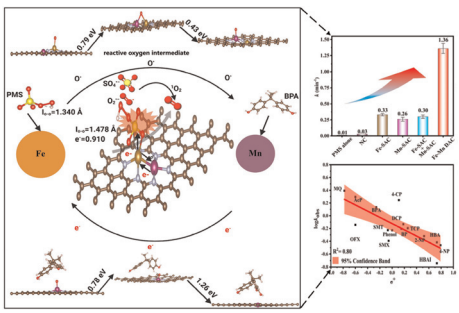
Fandong Kong and Ruixing Li*



17676

Breaking scaling relationship limitations in peroxymonosulfate activation through electronegativity-driven Fe–Mn dual-metal synergy

Manoj Kumar Panjwani, Yuqi Liu, Shihao Han, Danish Khan, Shaoxia Yang, Feng Xiao and Pan Gao*



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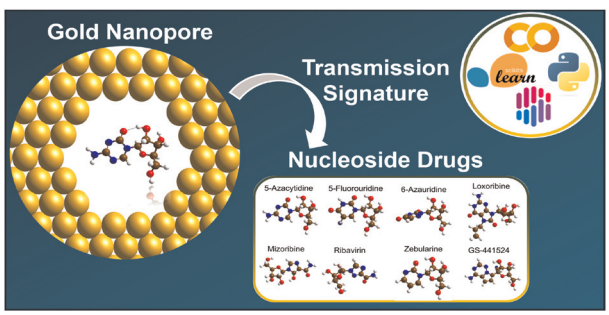
A hybrid supervised and unsupervised machine learning approach for identifying nucleoside drugs using nanopore readouts

Sneha Mittal, Milan Kumar Jena and Biswarup Pathak*



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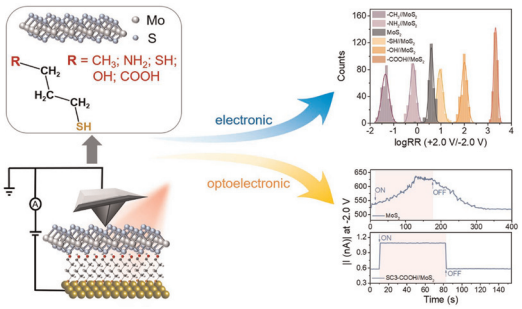
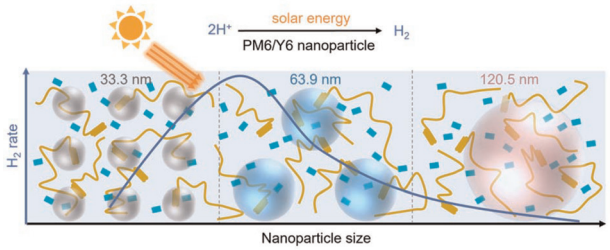


Enhanced MoS_2 heterojunctions by interface engineering with self-assembled monolayers

Fei Bao, Zhongchen Xu, Ying Wang, Pan Qi and Cunlan Guo*

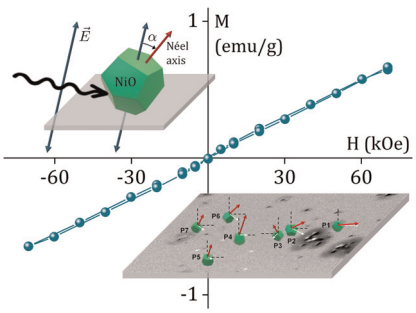
17711



Size-dependent hydrogen evolution in organic photovoltaic catalysts: balancing exciton dissociation and charge transport

Yueqian Jia, Yuanxin Liang, Yongli Yan,* Yuze Lin* and Chuang Zhang*

17719



Size-dependent antiferromagnetism and direct observation of Néel axes in NiO nanoparticles

Jorge Ara, Carlos Moya,* Montserrat García del Muro, Adriana I. Figueroa, Marta X. Aribó, Òscar Iglesias, Armin Kleibert, Amílcar Labarta, Arantxa Fraile Rodríguez* and Xavier Batlle*

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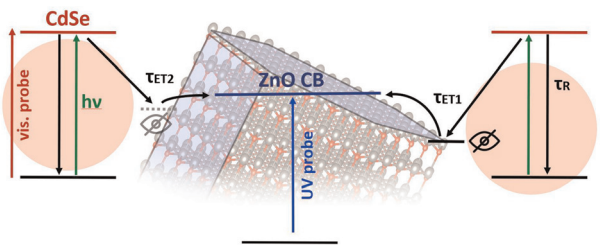

Bimodal interfacial charge transfer in quantum dot heterostructures revealed by donor-/acceptor-specific broadband transient absorption spectroscopy

Conner P. Dykstra, Thomas C. Rossi, Michael J. Enright, Josh Vura-Weis and Renske M. van der Veen*

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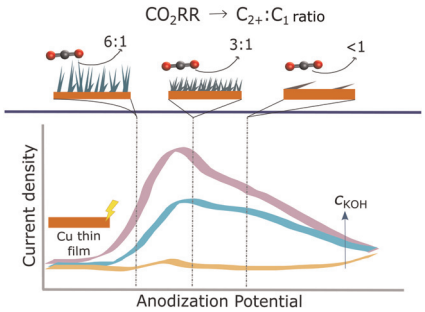
Nanostructuring copper thin film electrodes for CO_2 electroreduction to C_{2+} products

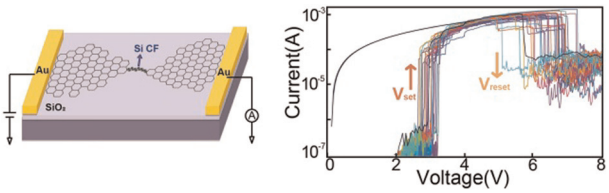
Dimitra Papamichail, Filippo Franceschini, Imran Abbas, Deema Balalta, Trang Thi Hong Nguyen, Deepak Pant, Sara Bals, Irene Taurino, Ewald Janssens,* Didier Grandjean* and Peter Lievens



17758

Temperature-dependent resistive switching statistics and mechanisms in nanoscale graphene–SiO_2–graphene memristors

Yuwen Cai, Wei Yu, Qiuhao Zhu, Xiyuan Liu, Xiao Guo and Wenjie Liang*



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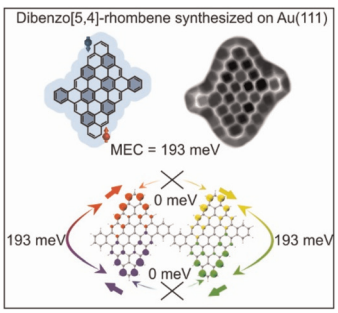
Strong magnetic exchange coupling of a dibenzo-fused rhomboidal nanographene and its homocoupling with tunable periodicities on a metal surface

Ana Barragán, Goudappagouda, Manish Kumar, Diego Soler-Polo, Elena Pérez-Elvira, Andrés Pinar Solé, Alba García-Frutos, Zhiqiang Gao, Koen Lauwaet, José M. Gallego, Rodolfo Miranda, David Écija,* Pavel Jelínek,* Akimitsu Narita* and José I. Urgel*



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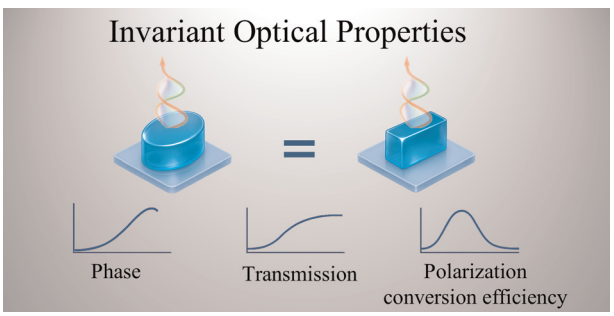
Invariant optical properties of dielectric nanofins in geometric phase metasurfaces

J. Carlos Basilio-Ortiz* and Ivan Moreno



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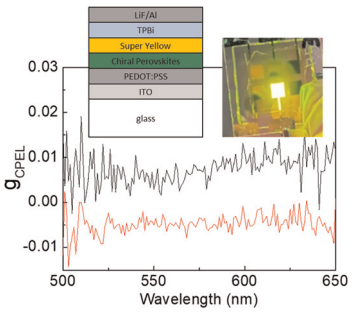
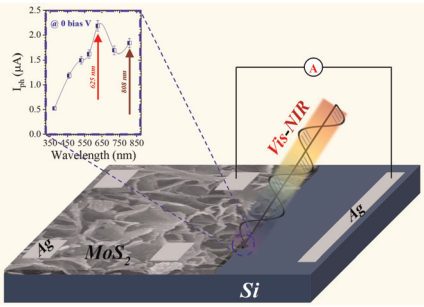


Room-temperature solution-processed spin organic light-emitting diodes based on chiral 2D halide perovskites

Lan-Sheng Yang,* Chun-Yao Huang, Chin-An Hsu, Hao-Zhe Chiu, Pei-Hsuan Lo and Yu-Chiang Chao*

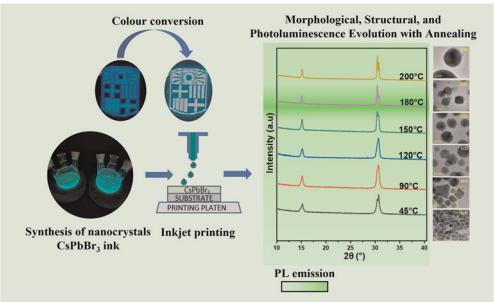
17795



Perpendicular sheet-like alignment of a self-driven MoS_2/Si heterostructure for Vis-NIR wavelength detection

Othman Abed Fahad, Abubaker S. Mohammed, Ethar Yahya Salih* and Mustafa K. A. Mohammed

17803



Effect of annealing temperature on the properties of $CsPbBr_3$ nanocrystal films *via* inkjet printing and its application in colour conversion layers

Junaid Khan,* Júlia Marí-Guaita, Kenneth Lobo, Giovanni Vescio, Carina Pareja-Rivera, Iván Mora-Seró, Sergi Hernández, Albert Cirera and Blas Garrido

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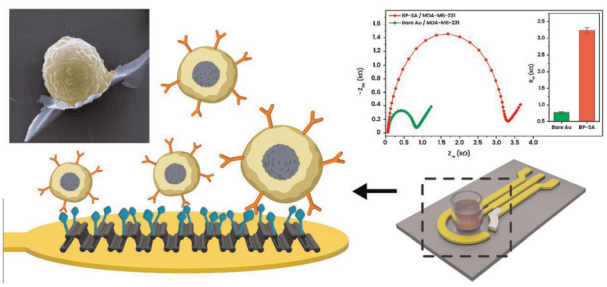

A novel high-sensitivity electrochemical sensor for cancer cell detection by means of phosphorene functionalized with sialic acid biomolecules

Asma Souri, Behzad Dadashnia, Nasrin Khazamipour, Omid Babaee, Ziba Torkashvand, Mehran Habibi-Rezaei and Shams Mohajerzadeh*

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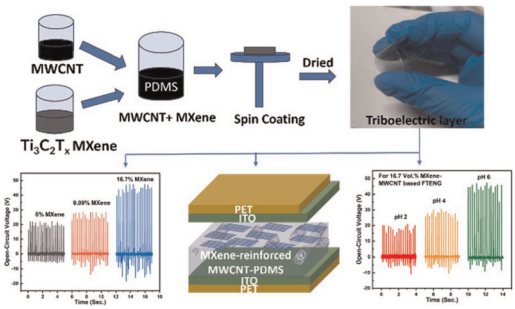
17830

A flexible MXene–carbon nanotube-based triboelectric nanogenerator for self-powered pH sensors

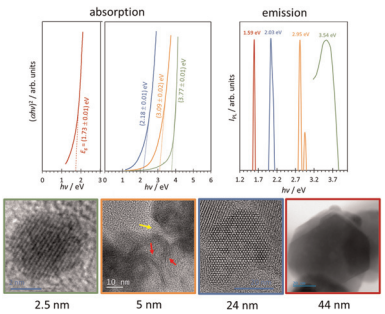
Sheetal Sharma, Vinod Kumar Singh* and Manoj Kumar Gupta*



17846

2 eV band gap tuning and optical properties of $AgIn_5S_8$ quantum dots

Biljana Pejova,* Julio A. do Nascimento, Fayzah Talbi, Thomas Jack Fawcett-Houghton, Adam Kerrigan, Leonardo Lari, Richard E. Douthwaite, Ljupcho Pejov and Vlado K. Lazarov*



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