

# Materials Advances

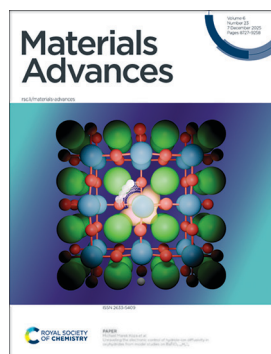
An open access journal publishing across the breadth of materials science

[rsc.li/materials-advances](https://rsc.li/materials-advances)

The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

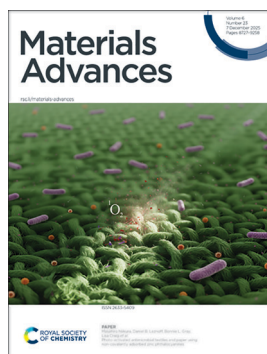
## IN THIS ISSUE

ISSN 2633-5409 CODEN MAADC9 6(23) 8727-9258 (2025)



### Cover

See Michael Marek Koza *et al.*, pp. 8885–8893.  
Image reproduced by permission of Lucas Fine from *Mater. Adv.*, 2025, 6, 8885.



### Inside cover

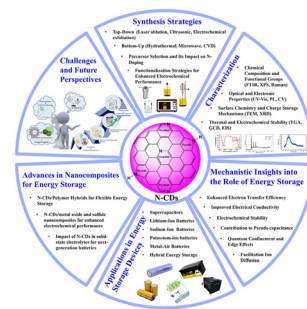
See Masahiro Niikura, Daniel B. Leznoff, Bonnie L. Gray, Lisa Craig *et al.*, pp. 8894–8906.  
Image reproduced by permission of Juan Ferrer from *Mater. Adv.*, 2025, 6, 8894.  
Image created using Google Gemini.

## REVIEWS

8740

### Advances in nitrogen-doped carbon dots for electrochemical energy storage: from synthesis to applications

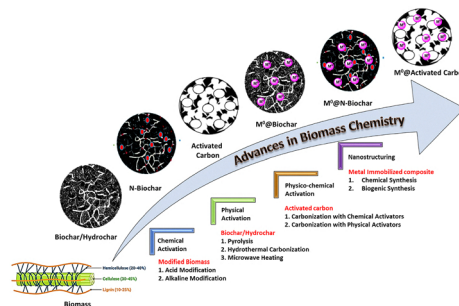
Sewara J. Mohammed,\* Awat S. Mohammed, Kazo K. Abdalla, Darya Sh. Hamad, Fryad S. Mustafa, Dana A. Kader, Kawan F. Kayani, Kovan K. Abdalla, Harez R. Ahmed and Shujahadeen B. Aziz



8774

### Advances in surface modification of biomass and its nanostructuring for enhanced environmental remediation applications

Sandeep Kumar,\* Parminder Kaur, Chou-Yi Hsu, Mohammed Ahmed Mustafa, Jyoti Rani, Jasmeen Kaur and Sandeep Kaushal\*



# EES Catalysis

GOLD  
OPEN  
ACCESS

## Exceptional research on energy and environmental catalysis

### Open to everyone. Impactful for all

[rsc.li/EESCatalysis](https://rsc.li/EESCatalysis)

Fundamental questions  
Elemental answers

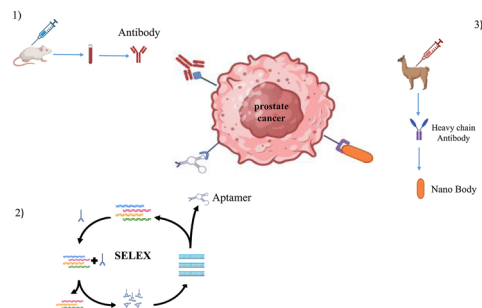


## REVIEWS

8816

### Novel approaches for detection and targeted therapy of prostate cancer using antibodies, aptamers, and nanobodies

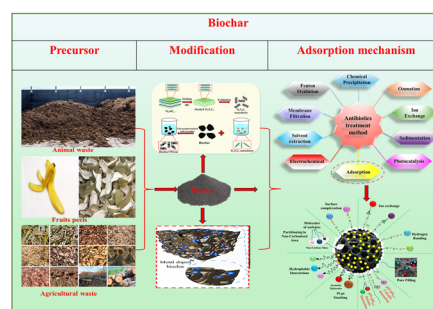
Mahdiah Mahboobi, Ali Najafi, Hamid Kooshki, Mozghan Kheirandish, Saeed Esmail Soofian and Hamid Sedighian\*



8839

### Progress in biochar derived adsorbents: preparation, modification strategies, and applications in remediation of antibiotics from wastewater

Van Doan Nguyen, The Anh Luu, Guo-Ping Chang-Chien and Van Giang Le\*

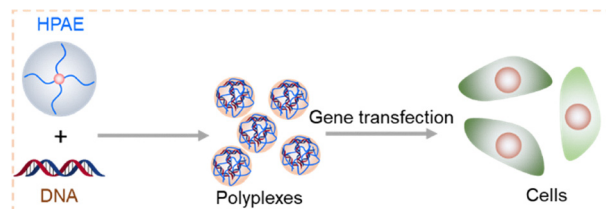


## COMMUNICATION

8877

### Highly branched poly( $\beta$ -amino ester)s with thiolated branching units for gene delivery

Yeqing Mao, Yixuan Wang, Xiaojia Wang, Wei Zhang, Chao Wen, Lei Guo,\* Dezhong Zhou\* and Zhili Li\*

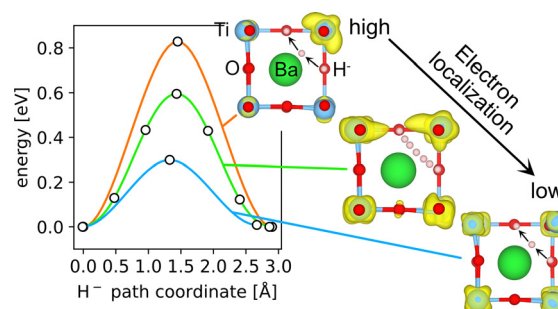


## PAPERS

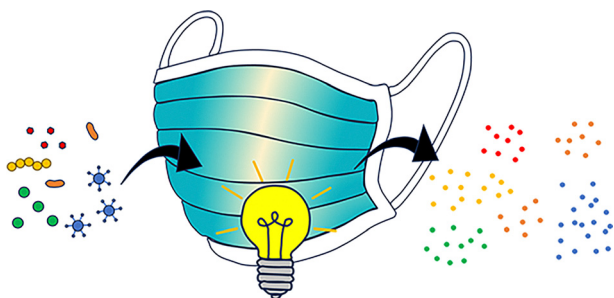
8885

### Unraveling the electronic control of hydride-ion diffusivity in oxyhydrides from model studies on $\text{BaTiO}_{3-2x}\text{H}_x\text{O}_x$

Lucas Fine, Maths Karlsson, Itai Panas and Michael Marek Koza\*



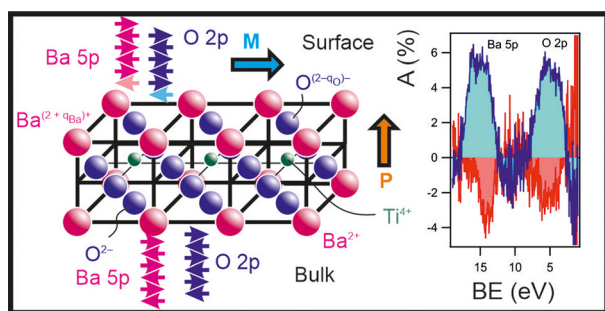
8894



### Photo-activated antimicrobial textiles and paper using non-covalently adsorbed zinc phthalocyanines

Juan Ferrer, Tzu-Hui Wu, Quiana Ang, Ryan J. Roberts, Yiwen Qi, Tom Bui, Mike Mai Chen, Siobhan Ennis, Yumeela Ganga-Sah, Basil Giannopoulos, Steven R. Kidd, Declan McKearney, Minh Nguyen, David M. Stevens, Wen Zhou, Masahiro Niikura,\* Daniel B. Leznoff,\* Bonnie L. Gray\* and Lisa Craig\*

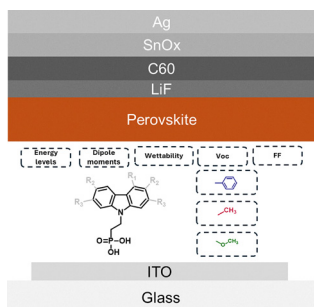
8907



### Surface spin asymmetry of O 2p and Ba 5p states in BaTiO<sub>3</sub>(001)

Larisa E. Borcan, Alexandru-Cristi Iancu, Nicoleta G. Apostol, Adela Nicolae and Cristian M. Teodorescu\*

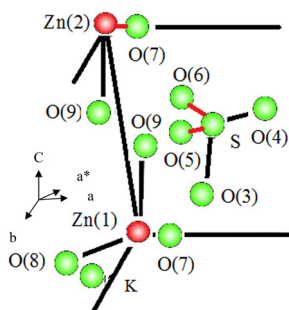
8921



### Screening of the carbazole-based phosphonic acids in perovskite solar cells: impact of the substitution pattern on device performance

Aida Drevilkuskaitė, Lea Zimmermann, Isabella Taupitz, Sergei Trofimov, Boris Naydenov, Eike Köhnen, Vytautas Getautis, Steve Albrecht and Artiom Magomedov\*

8930



### Local structure, zero field splitting and optical absorption of Mn<sup>2+</sup> doped ZnK<sub>2</sub>(SO<sub>4</sub>)<sub>2</sub>·6H<sub>2</sub>O single crystals

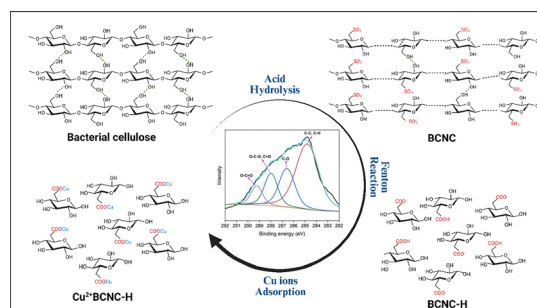
Maroj Bharati, Vikram Singh and Ram Kripal\*



8936

### Facile and green carboxylation of never-dried bacterial cellulose produced from low-cost substrates: structural characterization and copper binding performance

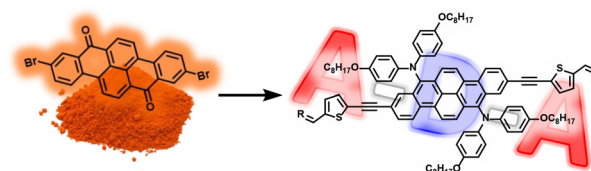
Mohammad Sadegh Jafari, Samaneh Ghadami, Shobha Mantripragada, Kristen Dellinger, Jeffrey R. Alston and Dennis R. LaJeunesse\*



8952

### Acceptor–donor–acceptor (A–D–A) derivatives based on dibenzochrysene

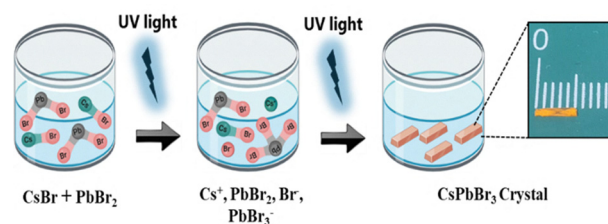
Félix Gagnon, Chloé Dindault, Eve Paradis, Guillaume Wantz and Jean-François Morin\*



8960

### UV-assisted rapid synthesis of high quality CsPbBr<sub>3</sub> perovskite single crystals

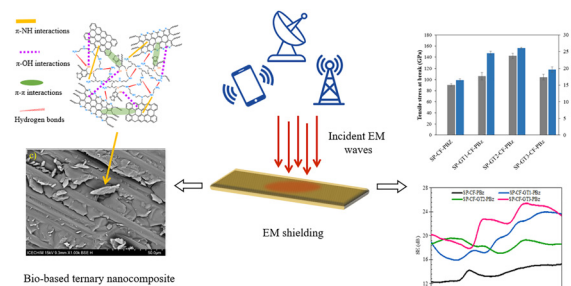
Mohammad A. Adeshina, Abdulazeez M. Ogunleye, Hakseon Lee, Gunwoo Kim, Hyunmin Kim and Jonghoo Park\*



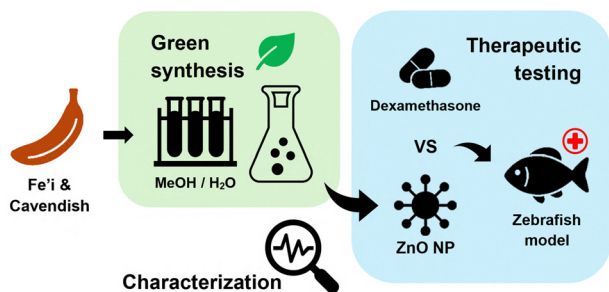
8968

### A ternary multiscale nanocomposite system based on functionalized graphene oxide, carbon fibers and bio-based polybenzoxazine for electromagnetic shielding

Madalina Ioana Necolau, Elena Iuliana Biru, Martino Aldrigo, Elena Olaret, Anamaria Zaharia, Gabriela Ciuprina and Horia Iovu\*



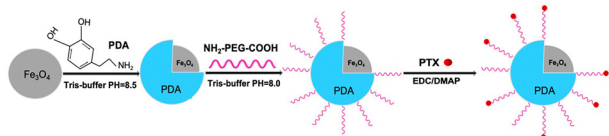
8988



### Green synthesis and anti-inflammatory properties of zinc oxide nanoparticles from Fe'i and Cavendish banana extracts

Nabilla Ghina Zavitri, Alia Putri Syahbaniati, Rindia M. Putri, Fenny Martha Dwivany, Indra Wibowo,\* Daniel Pramudita\* and Antonius Indarto\*

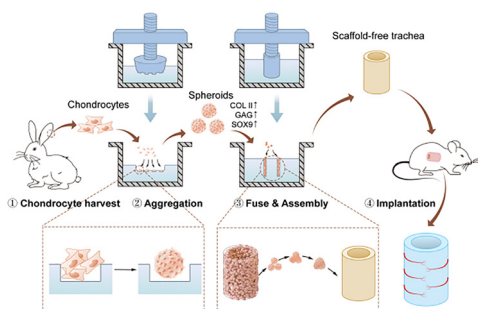
8997



### PTX-loaded Fe<sub>3</sub>O<sub>4</sub>@polydopamine nanoparticle complexes for antitumor therapy cell carcinoma: synergistic chemotherapy and *in vivo* efficacy

Jie Zhang, Qinkun Jiang, Zichen Xu, Zhiliang Nie, Runying Guo, Yang Liu, Xinjian Zhang, Wei Li and Jiaxuan Qiu\*

9011

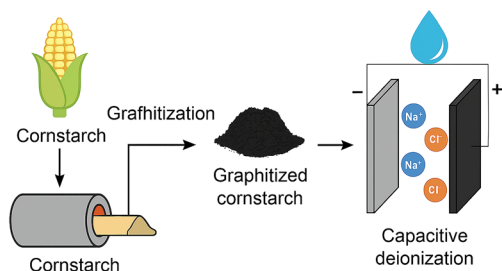


### Scaffold-free biofabrication of tissue engineered trachea by cartilage microtissue assembly

Long Wang, Weikang Lin, Lei Zhang, Yunlang She, Weiyan Sun, Hai Tang, Chao Lin\* and Chang Chen\*

9024

### Graphitized Cornstarch for CDI



### Graphitized cornstarch as a high-performance biomass-derived electrode for sustainable capacitive deionization

Nasser A. M. Barakat,\* Ahmed Khalid, Tamer Melegy and Marwa M. Abdel-Aty

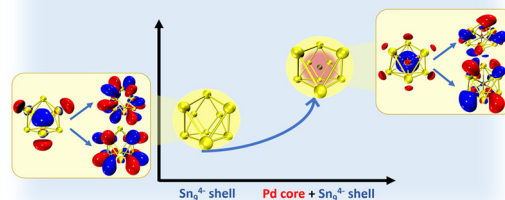


9043

### The core–shell structure improving the third-order nonlinear optical response of Zintl ions: $M@Sn_9^{4-}$

Jiali Chen, Zirui Wang, Yayu Yan, Wanting Xia, Xiaolan Zheng, Qiao-hong Li\* and Jian Zhang\*

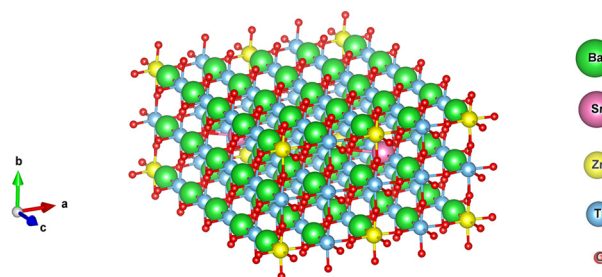
The core-shell structure improving the third-order nonlinear optical response



9051

### Experimental optical analysis and DFT study of the electronic, thermoelectric and optical characteristics of a co-doped perovskite system

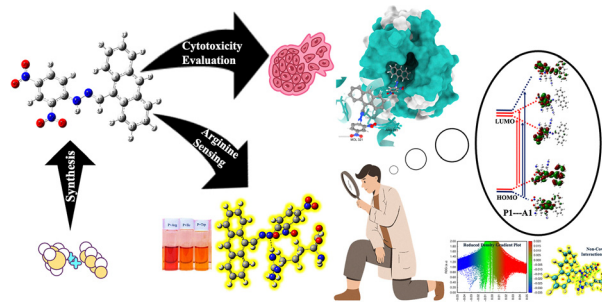
Y. Moulahi,\* A. Mabrouki, H. Rahmouni and E. Dhahri



9064

### Integrated experimental and computational investigation of a dual-functional colorimetric probe with anticancer activity for selective arginine sensing: insights from DFT, molecular docking, and molecular dynamics simulations

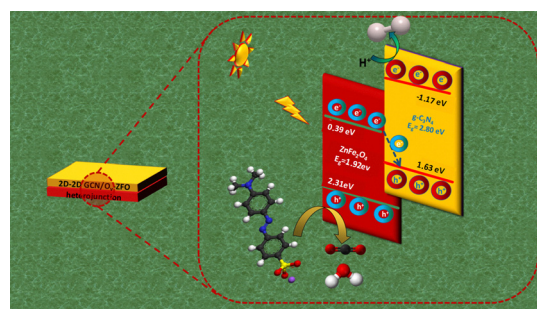
Aayushi Joshi, Nikunj Kumar Vagadiya, Nisarg Rana, Giftson J. Senapathy, Rakesh Rawal, Helly Shah, Ranjitsinh Devkar, Nandini Mukherjee\* and Anu Manhas\*



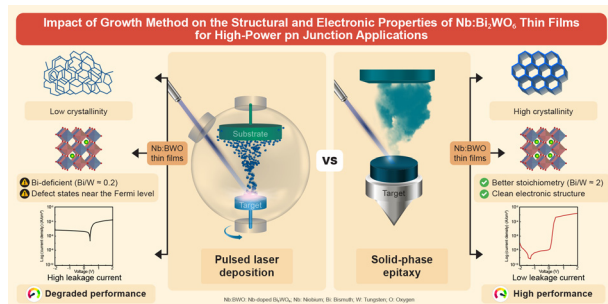
9085

### Fabrication of oxygen vacancy modified 2D–2D g-C<sub>3</sub>N<sub>4</sub>/ZnFe<sub>2</sub>O<sub>4</sub> heterostructures for amplifying photocatalytic methyl orange degradation and hydrogen production

Subhasish Mishra, Bhagat Lal Tudu, Nimai Mishra, Kali Sanjay and Rashmi Acharya\*



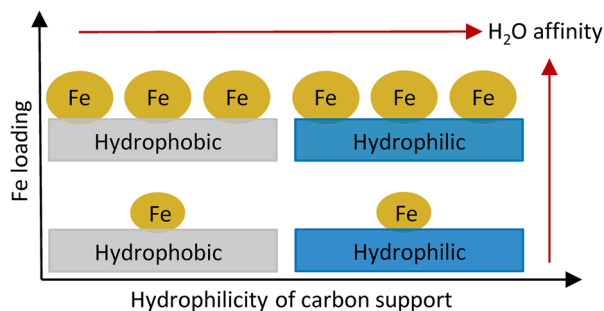
9104



## The impact of growth method on the structural and electronic properties of Nb:Bi<sub>2</sub>WO<sub>6</sub> thin films for high-power pn junction applications

Ichiro Takakuwa, Ryusuke Seino, Seiya Suzuki, Keishi Nishio, Shutaro Asanuma, Yoshihiro Nemoto, Yuki Nishimiya, Yoichi Higashi, Toshimitsu Ito and Makoto Minohara\*

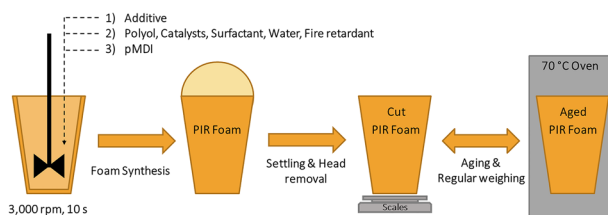
9113



## Hydrophobic and hydrophilic carbon supports for iron-based CO<sub>2</sub> hydrogenation catalysts: impact on high-pressure low-temperature reverse water gas shift and Fischer–Tropsch synthesis

Weixin Meng, Sri Rezeki, A. Iulian Dugulan, Martin Oschatz and Jingxiu Xie\*

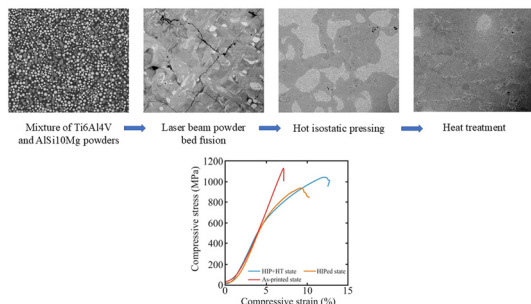
9125



## Reducing gas-loss in rigid polyisocyanurate foams using metal–organic frameworks

Michael S. Harris, Jonathan A. Foster\* and Anthony J. Ryan\*

9133



## Preparation of a Ti–Al–Si based intermetallic alloy from Ti6Al4V and AlSi10Mg powders by laser powder bed fusion and hot isostatic pressing

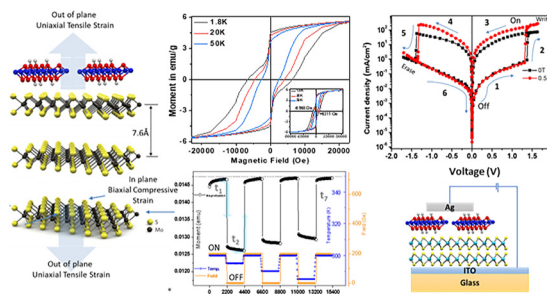
Tomas Cegan, Jan Jurica, Katerina Skotnicova,\* Marek Pagac, Michaela Stamborska, Lukas Horsak, Jiri Hajnys, Jakub Mesicek and Konda Gokuldoss Prashanth



9150

## Evolution of giant exchange bias with ferromagnetic ordering and a robust memory effect by strain engineering MoS<sub>2</sub> in weak antiferromagnetic gating

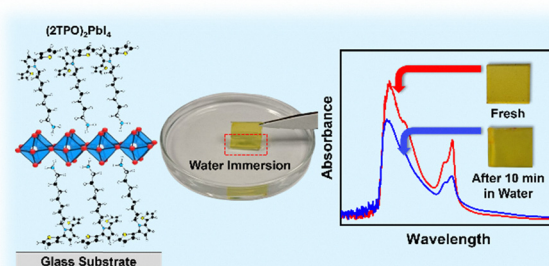
Shatabda Bhattacharya,\* Irina A. Kühne, Tatsuhiko Ohto and Hirokazu Tada



9168

## Relative water stability of powder vs. thin films of organic–inorganic halide perovskites including durability of a thin film bis(thiophenyl)-pyrrole lead iodide

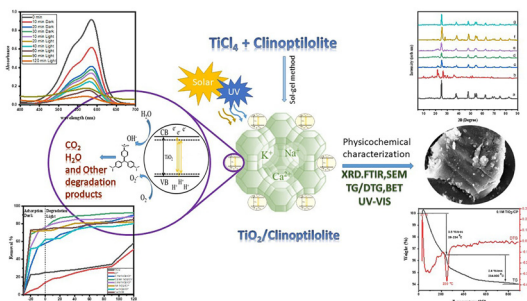
Abdul Basit Naveed, Matthew C. Mulvehill, Aftab Javaid, Craig A. Grapperhaus and Joshua M. Spurgeon\*



9179

## Degradation of CV dye by the as-synthesized Fe<sup>0</sup>-TiO<sub>2</sub> supported clinoptilolite under UV and solar irradiations

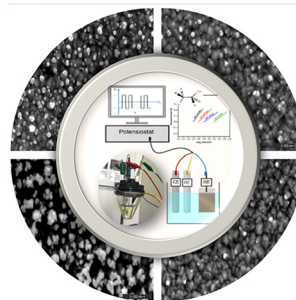
Nazia Aziz, Hamida Panezai,\* Jihong Sun, Noor Samad Shah, Raza Ullah, Ruohan Xu and Zakira Jogezeai



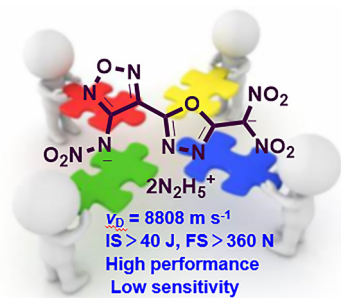
9196

## Deposition time-driven growth of gold nanoparticles for enhanced performance in ethanol electrooxidation

Setia Budi,\* Annisa Auliya and Hilman Syafei



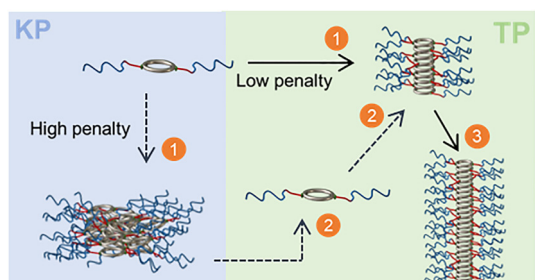
9203



### High performance and insensitive energetic compounds from the intelligent assembly of nitramino/*gem*-dinitromethyl group and oxadiazoles

Fangming Chen, Qiong Yu,\* Zihao Guo, Kejia Peng, Wenjie Zhou, Wenbin Yi,\* Richard J. Staples and Jean'ne M. Shreeve\*

9209

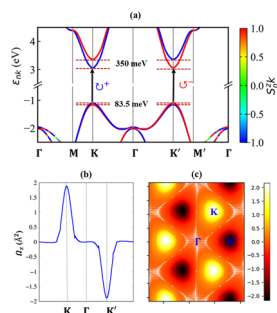


1). Entropy Compensation 2). Transfer 3). Thermodynamic Equilibrium

### Mapping the energy landscape of a supramolecular system *via* time-resolved asymmetric-flow field flow fractionation

Maria Kariuki, Julia Y. Rho and Sébastien Perrier\*

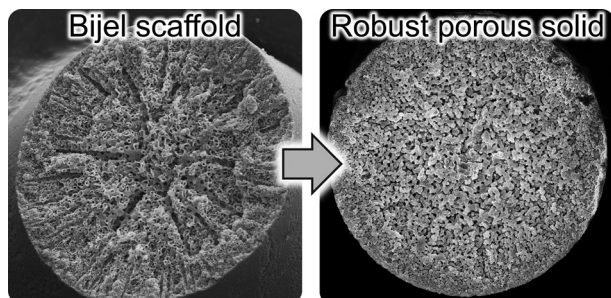
9220



### Valley spin-splitting in pristine and Cr- and Ni-doped $\text{HfN}_2$ monolayers

Nguyen Thi Han and Vo Khuong Dien\*

9229



### Regulated silica deposition for porosity control and mechanical enhancement of bicontinuous particle-stabilized emulsions

Meyer T. Alting and Martin F. Haase\*



9243

## Bridging the gap between performance and biocompatibility: non-toxic, multifunctional aliphatic photoinitiators based on $\alpha$ -ketoesters for lithography-based manufacturing applications

Antonella Fantoni, Judith Krauß, Theresa Ammann, Philipp Melchior, Dieter Nees, Martin Frauenlob, Robert Liska and Stefan Baudis\*

