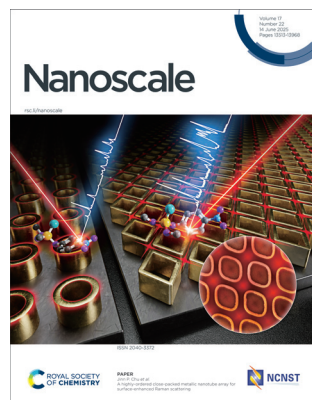


## IN THIS ISSUE

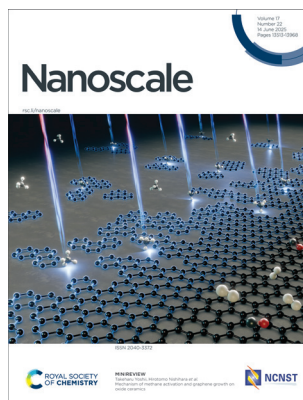
ISSN 2040-3372 CODEN NANOHL 17(22) 13513–13968 (2025)



### Cover

See Jinn P. Chu *et al.*, pp. 13685–13697.

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### Inside cover

See Takeharu Yoshii, Hirotomo Nishihara *et al.*, pp. 13646–13652.

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## EDITORIAL

13526

### Chiral nanomaterials: theory, synthesis, applications and challenges

Nicholas A. Kotov,\* Jeanne Crassous,\* David B. Amabilino\* and Pengfei Duan\*

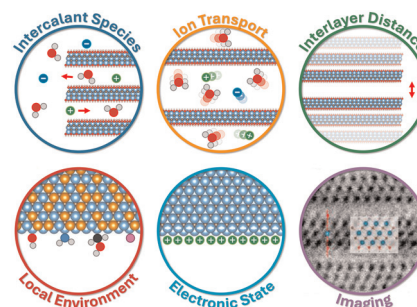


## REVIEWS

13531

### Material characterization methods for investigating charge storage processes in 2D and layered materials-based batteries and supercapacitors

Albert de Kogel, Ruocun (John) Wang,\* Wan-Yu Tsai,\* Maciej Tobis, Robert Leiter, Ruipeng Luo, Evan Wenbo Zhao,\* Simon Fleischmann\* and Xuehang Wang\*



# Environmental Science: Atmospheres

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

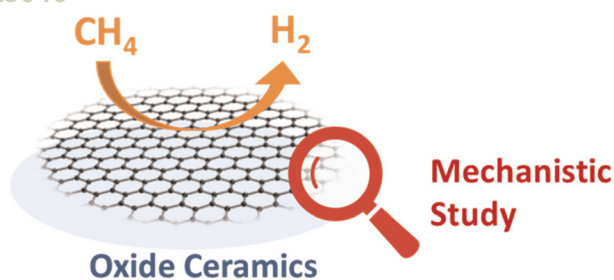
Fundamental questions  
Elemental answers





## MINIREVIEWS

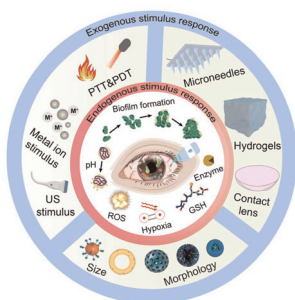
13646



### Mechanism of methane activation and graphene growth on oxide ceramics

Hanzhang Zhou, Mengxuan Zhang, Takeharu Yoshii,\*  
Devis Di Tommaso and Hiroto Nishihara\*

13653

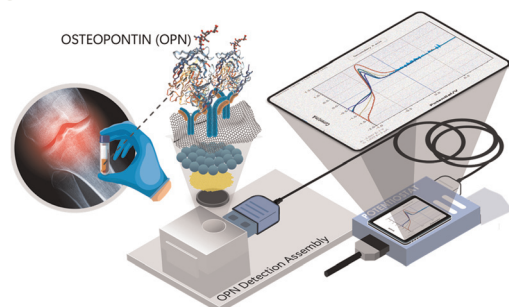


### Stimulus-responsive nanomaterials for ocular antimicrobial therapy

Tao Zhang and Zichao Luo\*

## COMMUNICATION

13668

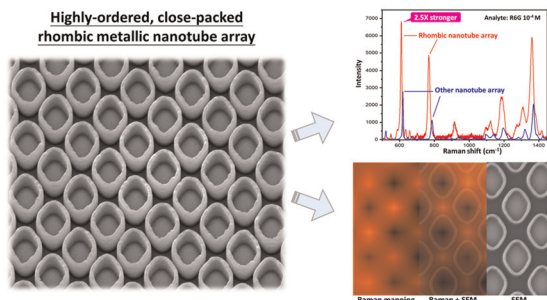


### An electrochemically charged nanoengineered bioelectronic immunosensing device for osteopontin detection in serum samples

Daphika S. Dkhar, Supratim Mahapatra and  
Pranjal Chandra\*

## PAPERS

13685



### A highly-ordered close-packed metallic nanotube array for surface-enhanced Raman scattering

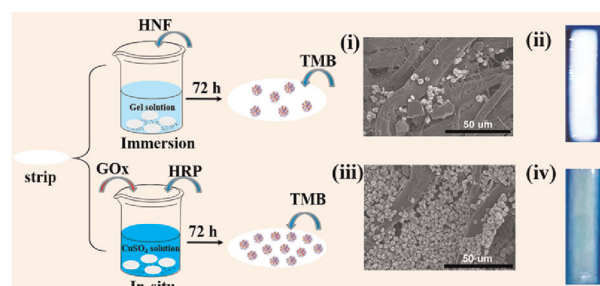
Ting-Hao Chang, Alfreda Krisna Altama,  
Jun-Ting Wang, Pakman Yiu and Jinn P. Chu\*



13698

### *In situ* growth of enzyme-inorganic hybrid nanoflowers on paper strips for the visual detection of saliva-level glucose

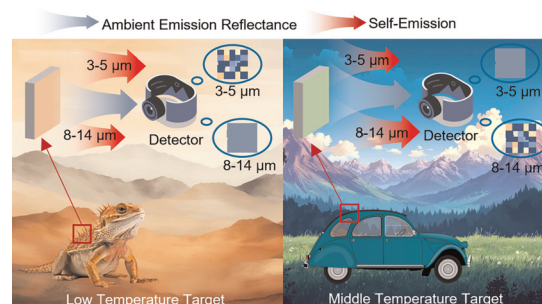
Zifeng Zhang,\* Shiwen Wang, Tingjun Chen, Hui Wang\* and Qian Dou\*



13708

### Tri-spectral decoupled programmable thermal emitter for multimode camouflage with heterogeneous phase-change integration

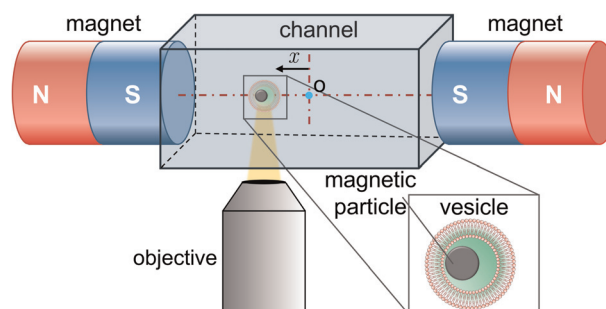
Sihong Zhou, Shikui Dong, Jiameng Song, Yanming Guo, Yong Shuai\* and Guangwei Hu\*



13720

### Magnetically driven lipid vesicles for directed motion and light-triggered cargo release

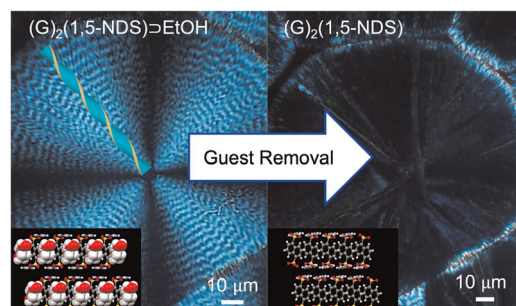
Vinit Kumar Malik, Chih-Tang Liao, Chenghao Xu, Abdallah Daddi-Moussa-Ider, On Shun Pak, Yuan-Nan Young and Jie Feng\*



13727

### Guest removal from ring-banded guanidinium organosulfonate hydrogen-bonded frameworks

Rochelle B. Spencer, Anna Yusov, Alexandra M. Dillon, Akash Tiwari, Oriol Arteaga, Sophia Sburlati, St. John Whittaker, Wantong Wu, Sixian Chen, Alexander G. Shtukenberg, Michael D. Ward,\* Bart Kahr\* and Stephanie S. Lee\*

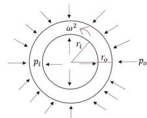


13737

COMPARATIVE ANALYSIS OF STEADY STATE CREEP IN SUS-ZrO<sub>2</sub> AND Al-ZrO<sub>2</sub> FUNCTIONALLY GRADED PRESSURIZED CYLINDERS WITH ITS IMPLICATIONSSahni et al., 2025 | *Nanoscale*

**BACKGROUND**  
Secondary Creep Analysis in Rotating Anisotropic Functionally Graded Cylinder (axisymmetric) Under Internal/External Pressure.

**MATERIAL AND METHOD**  
Functionally Graded Material. Exponential Volume Reinforcement of ZrO<sub>2</sub> in SUS and Al Metal Matrix. Closed Form Analytical Solution Using Norton's Creep Law.



**RESULT 3**  
Al-ZrO<sub>2</sub> FG cylinder is superior because it manages stress more efficiently, resists creep deformation better, and enhances long-term durability.

**RESULT 1**  
Al-ZrO<sub>2</sub> FG cylinder undergoes a lower tangential creep strain rate under an external pressure compared to the SUS-ZrO<sub>2</sub> FG cylinder.

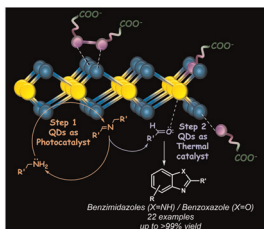
**RESULT 2**  
Al-ZrO<sub>2</sub> FG cylinder has lower creep strain rates in the radial direction at the outer radius under external pressure. This helps in minimizing deformation caused by angular body force, which is crucial for maintaining structural integrity over time.

**CONCLUSION**  
Al-ZrO<sub>2</sub> FG cylinder appears to be the more convenient choice compared to the SUS - ZrO<sub>2</sub> FG cylinder for applications involving external pressure and angular body force.

Comparative analysis of steady-state creep in SUS-ZrO<sub>2</sub> and Al-ZrO<sub>2</sub> functionally graded pressurized cylinders and its implications

Manoj Sahni,\* Parth Dinesh Mehta and Sandeep Kumar Paul

13746

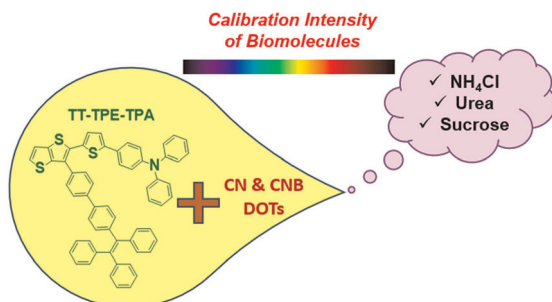


- ✓ Facile protocol for generation of a diverse range of bioactive benzimidazoles/benzoxazole.
- ✓ Application of surface-engineered TMD as bifunctional catalyst.
- ✓ Reusable, economical and easy-to-prepare catalyst.
- ✓ Benign reaction conditions.
- ✓ Nanocatalyst mediates the formation of active ingredients *in situ*.

## Thiolated molybdenum diselenide quantum dots as a bifunctional catalyst towards the synthesis of benzimidazoles

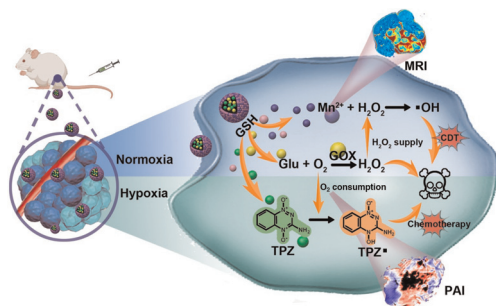
Komal Jaiswal, Rushikesh Jagtap and Mrinmoy De\*

13756

Thienothiophene-based quantum dots: calibration of photophysical properties *via* carbon dot and biomolecular interactions

Recep Isci,\* Ozge Ibis, Garen Suna, Caner Unlu\* and Turan Ozturk\*

13767



## Smart self-assembly of a multifunctional theranostic nanozyme for self-enhanced precise chemo/chemodynamic therapy

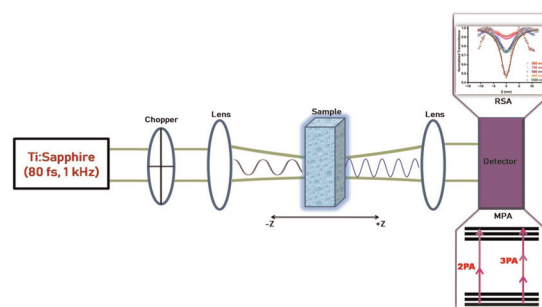
Jin Tao, Junhui Wei, Junnan Kan, Kai Qi, Tingting Wang, Ailing Wang, Wenxin Pei, Haiyan Gao, Caixia Yang\* and Xianglin Li\*



13777

### Broadband laser protection and enhanced nonlinear optical response of samarium–metal–organic framework-based white/black carbon hybrids

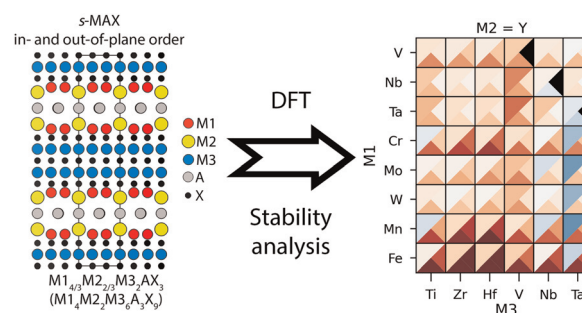
M. Saravanan,\* Vinod K. Rajput, K. Suresh, Sri Ram G. Naraharisetty, Sajan D. George, I. Vetha Potheher,\* Marek Brzeziński and B. N. Vedha Hari



13787

### Combined in- and out-of-plane chemical ordering in super-ordered MAX phases (s-MAX)

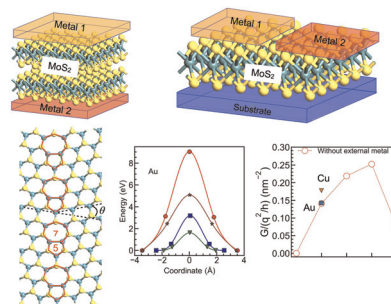
Martin Dahlqvist\* and Johanna Rosen\*



13797

### Effect of grain boundaries on metal atom migration and electronic transport in 2D TMD-based resistive switches

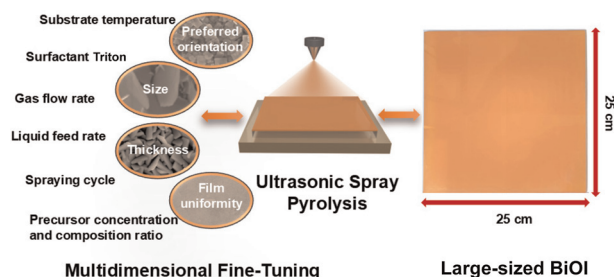
Mohit D. Ganeriwala,\* Daniel Luque-Jarava, Francisco Pasadas, Juan J. Palacios, Francisco G. Ruiz, Andres Godoy\* and Enrique G. Marin



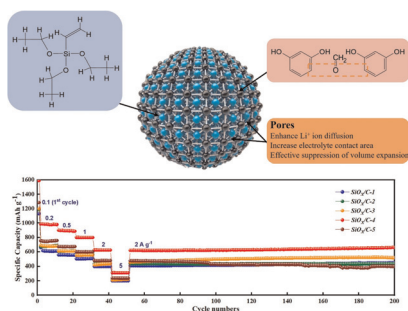
13808

### Enabling multidimensional fine-tuning of large-sized BiOI films using ultrasonic spray pyrolysis

Hao Wang, Weilong Qin, Qitao Liu, Neway Belachew, Jianming Li, Qinglu Liu, Jiabo Le and Yongbo Kuang\*



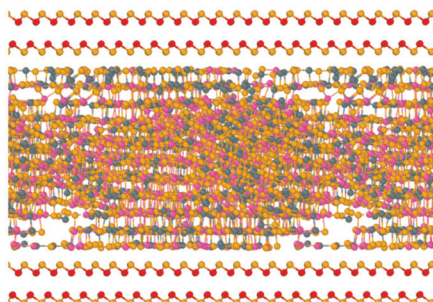
13818



### SiO<sub>x</sub>/C composite spheres as an anode material for high-performance lithium-ion batteries

Ho Jin Yoo, Eun Mi Kim\* and Sang Mun Jeong\*

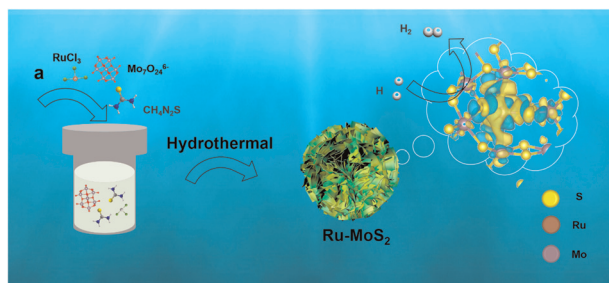
13828



### Simulation of the crystallization process of Ge<sub>2</sub>Sb<sub>2</sub>Te<sub>5</sub> nanoconfined in superlattice geometries for phase change memories

Debdipto Acharya, Omar Abou El Kheir, Simone Marcorini and Marco Bernasconi\*

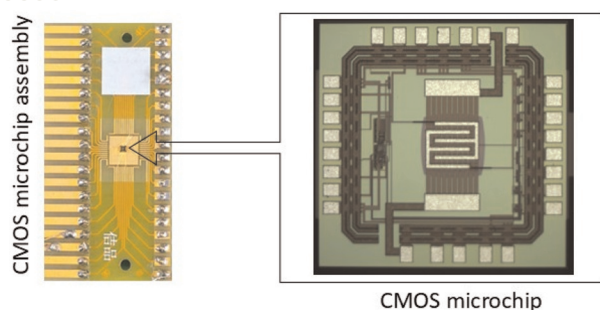
13842



### Ru doping induces phase transition and in-plane S-site electronic modulation in ternary MoS<sub>2</sub> heterostructures to enhance hydrogen evolution in water/seawater

Jianpeng Sun, Jianan Rao, Shiyu Qin, Xiang Li, Ru Jia, Kelei Huang, Yu Zheng and Xiangchao Meng\*

13850



### Low temperature inkjet-printed metal oxide sensors for sensitive and selective NO<sub>2</sub> detection

P. K. Shihabudeen, Shivam Gupta, Yu-Hsien Lin, Shih-Wen Chiu, Yu Ting Chuang, Yuan Fu Tang, Nyan-Hwa Tai and Kea-Tiong Tang\*

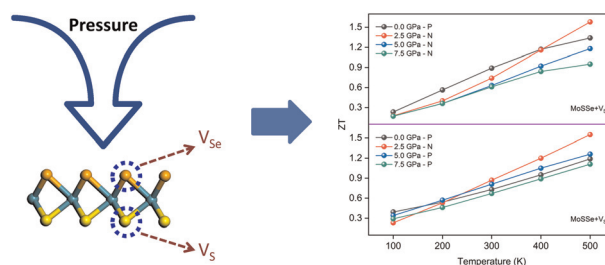


## PAPERS

13861

### Effect of pressure on the thermoelectric performance of monolayer Janus MoSSe materials with different native vacancy defects

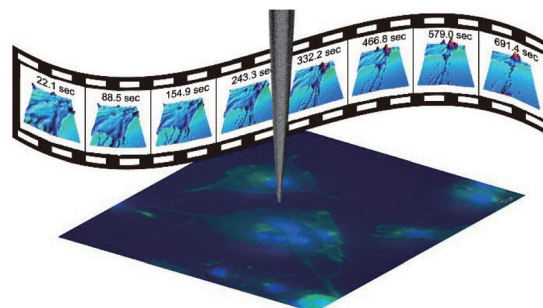
Yuan Shang, Xiaopeng Pan, Yanxing Jia, Yuqiang Wu and Mengtao Sun\*



13869

### Nanoscale structural dynamics of cell edges in breast tumour cells revealed by scanning ion conductance microscopy

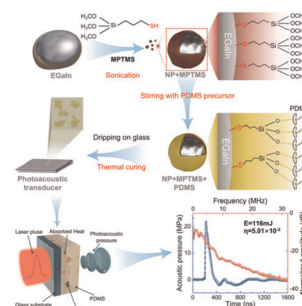
Masahiro Yamazaki, Linhao Sun, Tatsunori Nishimura, Tsunaki Hongu, Shigeyuki Takamatsu, Toshifumi Gabata, Noriko Gotoh\* and Shinji Watanabe\*



13880

### High-efficiency photoacoustic transducers based on plasmonic EGaIn liquid metal nanoparticles

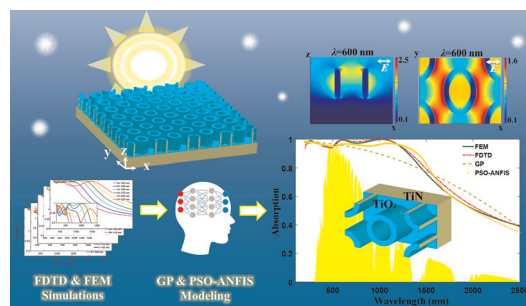
Cheng Luo, Rui Zhou, Yihao Li, Min Li, Xiaoyan Wen, Ming-Yu Li, Shuo Deng, Sisi Liu, Hongyun Gao\* and Haifei Lu\*



13888

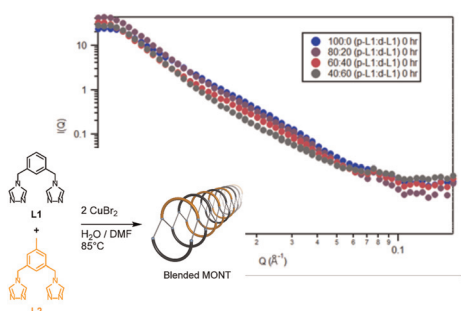
### Machine-learning-empowered FDTD/FEM simulations for predictive solar energy absorption in plasmonic metamaterial nanocavity arrays

Zahra Ashrafi-Peyman, Amir Dashti, Amir Jafargholi, John L. Zhou\* and Alireza Z. Moshfegh\*



## PAPERS

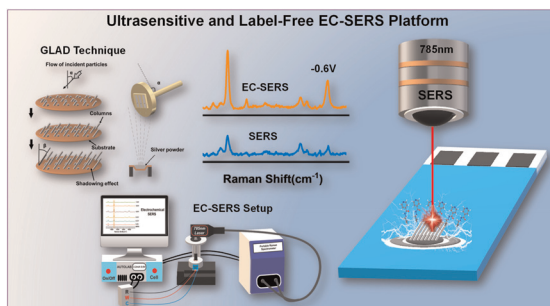
13905



### Insights into the copolymerization of metal-organic nanotubes from ligand mixtures using small angle neutron scattering

Md Ashraful Haque, Jacob A. Barrett, Xian B. Carroll, David M. Jenkins\* and Mark D. Dadmun\*

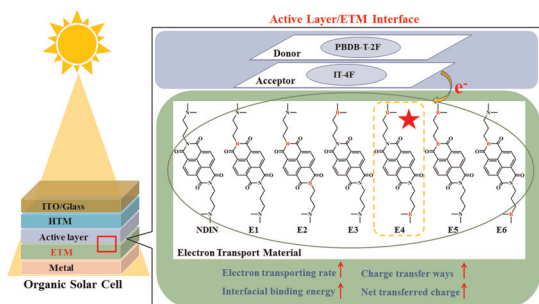
13915



### Potential-modulated SERS profiling via GLAD-fabricated Ag nanorod arrays for ultrasensitive and label-free spectroelectrochemical sensing

Lakshay Bhardwaj, Jyoti Yadav and J. P. Singh\*

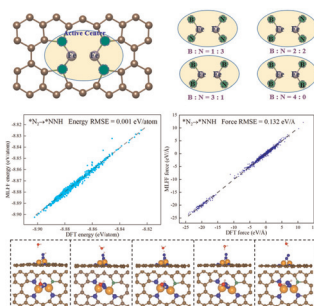
13929



### Boron-containing electron transport materials based on naphthalene diimide for organic solar cells: a theoretical study

Shu-Pu Yao, Jie Yang,\* Qian Guo, Xiao-Juan Yang and Quan-Song Li\*

13939



### Exploring dual-iron atomic catalysts for efficient nitrogen reduction: a comprehensive study on structural and electronic optimization

Zhe Zhang,\* Wenxin Ma, Jiajie Qiao, Xiaoliang Wu, Shaowen Yu, Weiye Hou, Xiang Huang, Rubin Huo, Hongbo Wu\* and Yusong Tu\*



13951

## Cuticular proteins (crusticuls) affect 3D chitin bundle nanostructure

Shai A. Shaked, Simy Weil, Rivka Manor, Eliahu D. Aflalo, Sharon Moscovitz, Nitzan Maman, Raquel Maria, Benjamin Kruppke, Thomas Hanke, Jerry Eichler, Barak Ratzker, Maxim Sokol and Amir Sagi\*

