

# Nanoscale Advances

An open access journal publishing across the breadth of nanoscience and nanotechnology  
**rsc.li/nanoscale-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 2516-0230 CODEN NAADAI 6(14) 3465–3684 (2024)



### Cover

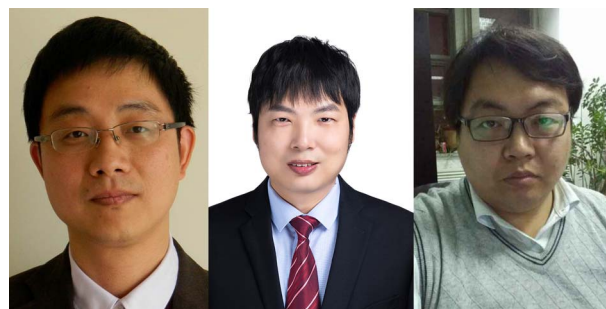
See Angela Lombardi, Flavia Nastri *et al.*, pp. 3533–3542.  
Image reproduced by permission of Emilia Renzi, Alessandra Esposito, Linda Leone, Miriam Chávez, Teresa Pineda, Angela Lombardi and Flavia Nastri from *Nanoscale Adv.*, 2024, 6, 3533.

## EDITORIAL

3474

### Introduction to nanoclusters: from theory to application

Yi Gao,\* Daojian Cheng\* and Zhigang Wang\*

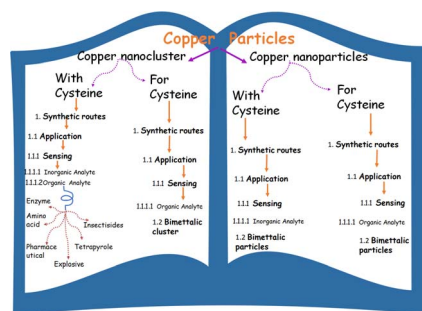


## REVIEWS

3476

### Analytical developments in the synergism of copper particles and cysteine: a review

Priyanka Sharma, Mainak Ganguly\* and Ankita Doi



# RSC Sustainability

GOLD  
OPEN  
ACCESS

Dedicated to sustainable  
chemistry and new solutions

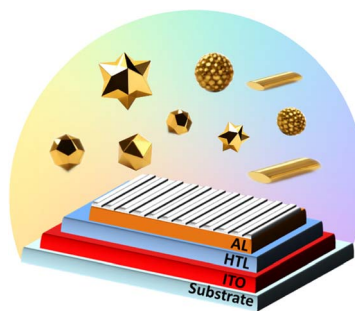
For an open, green and inclusive future

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

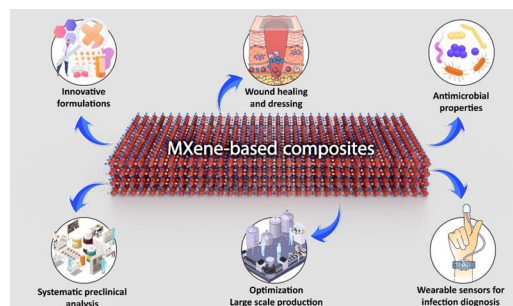
Fundamental questions  
Elemental answers

## REVIEWS

3494

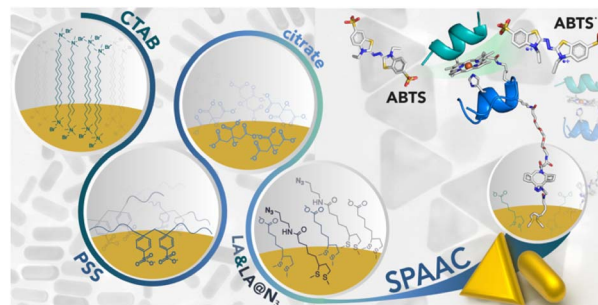
**Gold nanostructures/quantum dots for the enhanced efficiency of organic solar cells**Apichat Phengdaam,<sup>\*</sup> Sopit Phetsang, Sachiko Jonai, Kazunari Shinbo, Keizo Kato and Akira Baba<sup>\*</sup>

3513

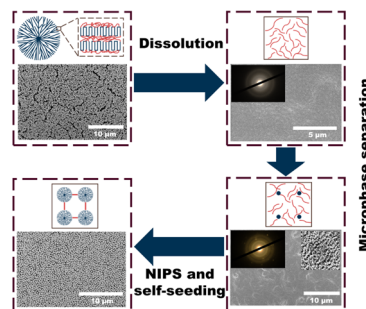
**MXene-based composites in smart wound healing and dressings**Atefeh Zarepour, Nesa Rafati, Arezoo Khosravi,<sup>\*</sup> Navid Rabiee, Siavash Irvani<sup>\*</sup> and Ali Zarrabi<sup>\*</sup>

## PAPERS

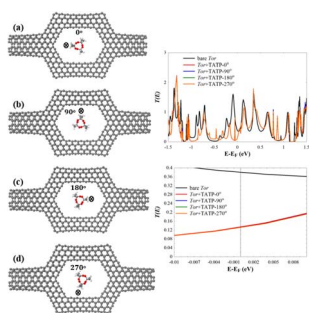
3533

**Biohybrid materials comprising an artificial peroxidase and differently shaped gold nanoparticles**Emilia Renzi, Alessandra Esposito, Linda Leone, Miriam Chávez, Teresa Pineda, Angela Lombardi<sup>\*</sup> and Flavia Nastro<sup>\*</sup>

3543

**Fabrication of nanoparticle array membranes by integrating semi-crystalline polymer self-assembly with NIPS for water treatment**Yu Ma, Xiaoli Zhao<sup>\*</sup> and Bin He<sup>\*</sup>

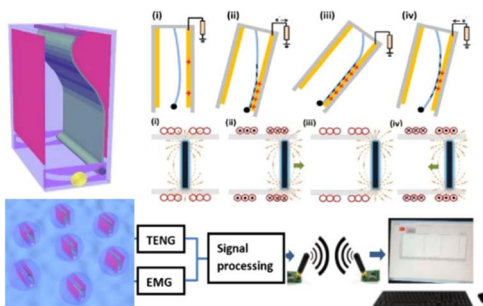
3553



### Robust nanotube-based nanosensor designed for the detection of explosive molecules

Laith A. Algharagholy, Víctor Manuel García-Suárez\* and Kareem Hasan Bardan

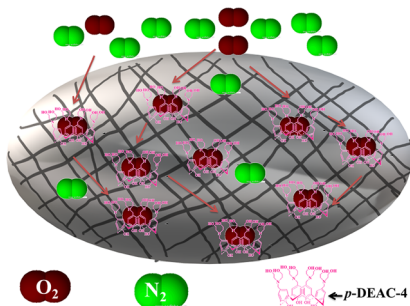
3566



### Triboelectric–electromagnetic hybrid nanogenerator for harvesting blue energy and creating an ocean wave warning system

Weichao Wang, Yaju Zhang,\* Guoxi Wu, Zhengyin Zhao, Yonghui Wu and Haiwu Zheng

3573



### The *p*-diethanolaminomethylcalix[4]arene-incorporated polyacrylonitrile-based facilitated-transport-nanofiber mat for O<sub>2</sub>/N<sub>2</sub> separation

Mehwish Ajmal, Saeed Ahmed Memon, Huma Shaikh,\* Shahabuddin Memon and Shahnaila Shah

3582



### Blue phosphorene on Au(111): theoretical, spectroscopic and diffraction analysis reveal the role of single Au adatoms

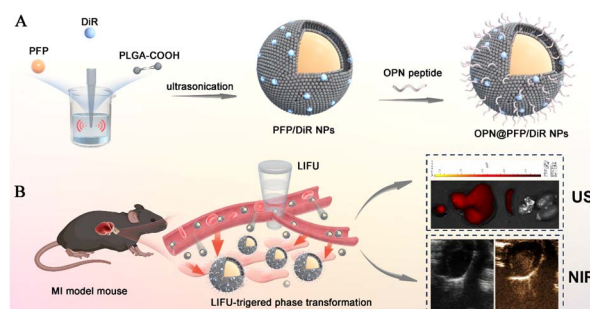
Simone Del Puppo, Pietro Biasin, Alessandro Sala,\* Paola Mantegazza, Ivan Pasqua, Elena Ghidorsi, Maria Caporali, Andrea Resta, Alessandro Coati, Francesca Genuzio, T. Onur Menteş, Andrea Locatelli, Giovanni Comelli, Cristina Africh, Erik Vesselli, Maria Peressi\* and Alberto Verdini\*



3590

### A non-invasive osteopontin-targeted phase changeable fluorescent nanoprobe for molecular imaging of myocardial fibrosis

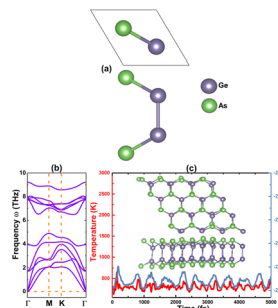
Xueli Zhao, Yuze Qin, Bo Wang, Jiao Liu, Yueyue Wang, Kun Chen, Jia Zhao, Lanlan Zhang, Yuanming Wu\* and Liwen Liu\*



3602

### Controlling the electronic and magnetic properties of the GeAs monolayer by generating Ge vacancies and doping with transition-metal atoms

D. M. Hoat,\* R. Ponce-Pérez, Chu Viet Ha and J. Guerrero-Sanchez



3612

### Pd NPs decorated on crosslinked sodium alginate modified iron-based metal–organic framework Fe(BTC) as a green multifunctional catalyst for the oxidative amidation

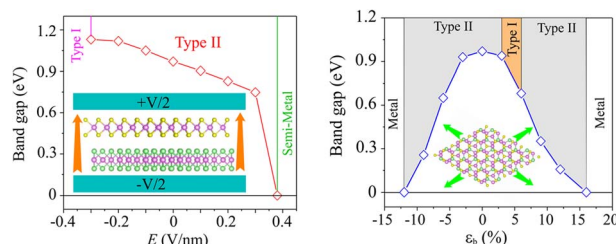
Samaneh Koosha, Ramin Ghorbani-Vaghei,\* Sedigheh Alavinia, Rahman Karimi-Nami and Idris Karakaya



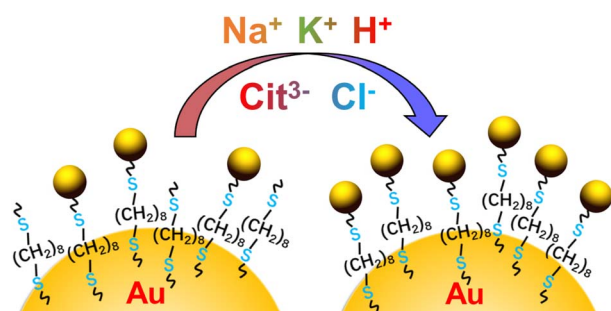
3624

### First-principles investigations of the controllable electronic properties and contact types of type II MoTe<sub>2</sub>/MoS<sub>2</sub> van der Waals heterostructures

Son T. Nguyen, Nguyen V. Hieu, Huy Le-Quoc, Kien Nguyen-Ba,\* Chuong V. Nguyen, Huynh V. Phuc and Cuong Q. Nguyen\*



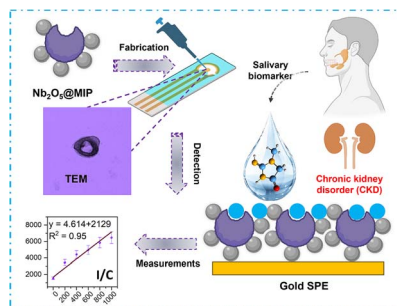
3632



### Rapid formation of gold core–satellite nanostructures using Turkevich-synthesized satellites and dithiol linkers: the do's and don'ts for successful assembly

Runze Tang, Robert A. Hughes, Walker J. Tuff, Ana Corcoran and Svetlana Neretina\*

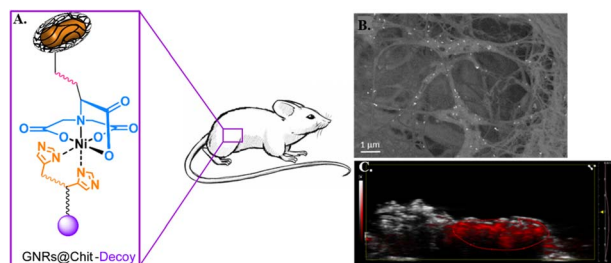
3644



### Core–shell niobium(v) oxide@molecularly imprinted polythiophene nanoreceptors for transformative, real-time creatinine analysis

Zohaib Saddique, Maleeha Saeed, Muhammad Faheem, Sadia Z. Bajwa, Adnan Mujahid and Adeel Afzal\*

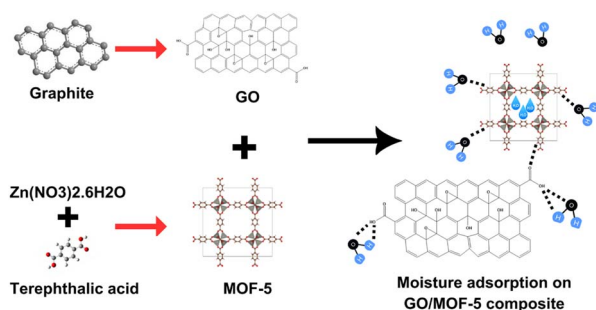
3655



### Contrast enhanced photoacoustic detection of fibrillar collagen in the near infrared region-I

Inna Solomonov, Irene Locatelli, Silvia Tortorella, Manu Unni, Shay-Lee Aharoni, Elisa Alchera, Erica Locatelli, Mirko Maturi, Chiara Venegoni, Roberta Lucianò, Andrea Salonia, Angelo Corti, Flavio Curnis, Valeria Grasso, Gayathri Malamal, Jithin Jose, Mauro Comes Franchini,\* Irit Sagi\* and Massimo Alfano\*

3668



### A comparative study of moisture adsorption on GO, MOF-5, and GO/MOF-5 composite for applications in atmospheric water harvesting

Muhammad Saeed-Ul-Hassan, Muhammad Ehtisham, Ahmad K. Badawi, Asad Muhammad Khan, Rafaqat Ali Khan and Bushra Ismail\*



## CORRECTIONS

3680

**Correction: Physical probing of quantum energy levels in a single indium arsenide (InAs) quantum dot**

Moh'd Rezeq,\* Yawar Abbas, Boyu Wen, Zbig Wasilewski and Dayan Ban\*

3681

**Correction: Improvements in properties of polybenzoxazine-based laser-induced graphene (LIG) by alloying with polyimide and modeling of production process**

Ibrahim Lawan, Panuwat Luengrojanakul, Krittapas Charoensuk, Hariharan Argunam, Cheol-Hee Ahn and Sarawut Rimdusit\*

