

Materials Advances

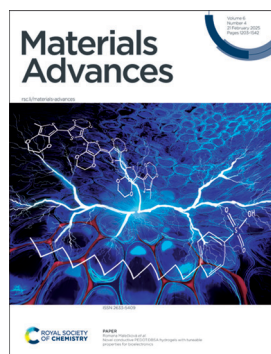
An open access journal publishing across the breadth of materials science

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(4) 1203-1542 (2025)



Cover

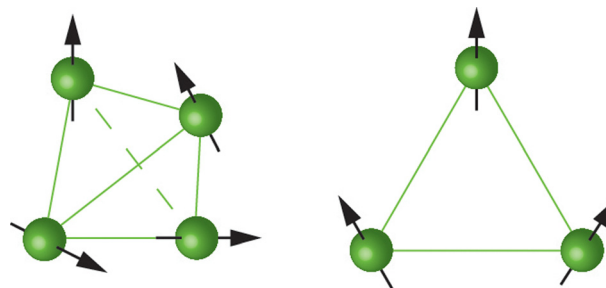
See Romana Malečková *et al.*, pp. 1278–1287.
Image reproduced by permission of Faculty of Chemistry, Brno University of Technology from *Mater. Adv.*, 2025, 6, 1278.
The cover artwork was created by Renata Svojanovská, Brno University of Technology.

REVIEWS

1213

Short-range order and hidden energy scale in geometrically frustrated magnets

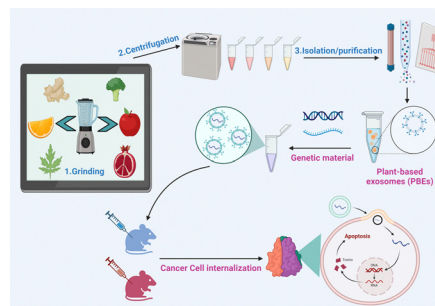
A. P. Ramirez and S. V. Syzranov



1230

Deploying nucleic acids-loaded plant-derived exosomes as green nano gadget in cancer gene therapy

Marola Paula Fawzy, Hatem A. F. M. Hassan, Muhammad Umair Amin, Eduard Preis, Udo Bakowsky* and Sherif Ashraf Fahmy*



**GOLD
OPEN
ACCESS**

EES Solar

**Exceptional research on solar
energy and photovoltaics**



Part of the EES family

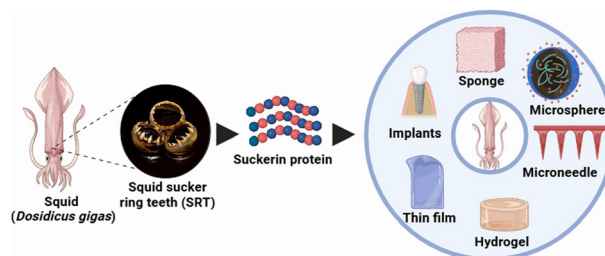
**Join
in** | Publish with us
rsc.li/EESSolar

REVIEWS

1262

Suckerin based biomaterials for wound healing: a comparative review with natural protein-based biomaterials

Samson Prince Hiruthyaswamy and Kanagavel Deepankumar*

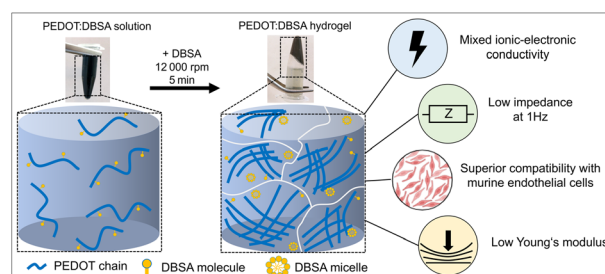


PAPERS

1278

Novel conductive PEDOT:DBSA hydrogels with tuneable properties for bioelectronics

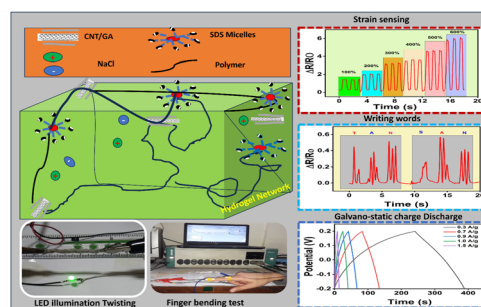
Romana Malečková,* Šárka Tumová, Petr Smíštel, Jiří Smílek, Helena Šimůnková, Michaela Pešková, Lubomír Kubáč, Jaromír Hubálek, Jan Vítěček, Martin Vala and Martin Weiter



1288

Gum arabic-CNT reinforced hydrogels: dual-function materials for strain sensing and energy storage in next-generation supercapacitors

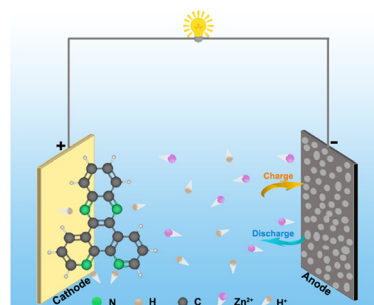
Tanzil UrRehman, Sher Ali Khan, Luqman Ali Shah* and Jun Fu



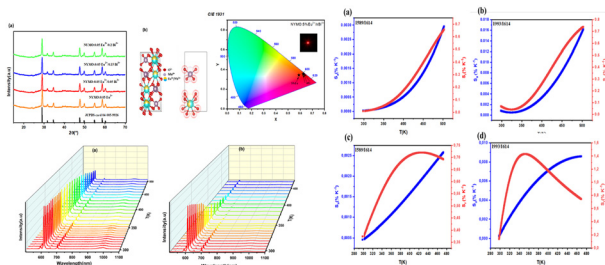
1300

Proton insertion chemistry in a phenazine-based cathode for aqueous Zn-organic batteries

Yutian Xiang, Xinran Li, Chaoyi Qiu, Wenhui Yang, Lei Liu, Haoxiang Yu, Liyuan Zhang, Lei Yan* and Jie Shu*



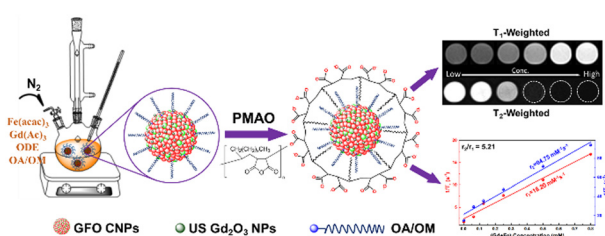
1307



Enhancing the luminescence intensity of Eu^{3+} -activated $\text{NaYb}(\text{MoO}_4)_2$ phosphors through bismuth doping: Judd–Ofelt analysis, lighting, and temperature-sensing applications

Yosra Bahrouni, Ikhlas Kachou, Kamel Saidi, Tarak Kallel, Mohamed Dammak,* Irene Mediavilla and Juan Jiménez

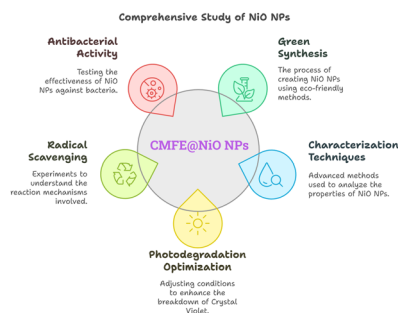
1319



Biocompatible PMAO-coated $\text{Gd}_2\text{O}_3/\text{Fe}_3\text{O}_4$ composite nanoparticles as an effective T_1 – T_2 dual-mode contrast agent for magnetic resonance imaging

Le T. T. Tam, Nguyen T. N. Linh, Le T. Tam, Duong V. Thiet, Pham H. Nam, Nguyen T. H. Hoa, Le A. Tuan, Ngo T. Dung and Le T. Lu*

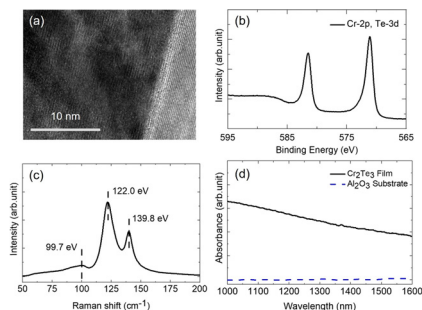
1330



Optimization of photodegradation of crystal violet dye and biomedical applications of greenly synthesized NiO nanoparticles

Abu Bakar Siddique, Muhammad Ashraf Shaheen,* Shakra Shafeeq, Azhar Abbas, Yasir Zaman, Muhammad Zahid Ishaque and Muhammad Aslam

1345



Optical nonlinear refractive index measurements of Cr_2Te_3 with an immense photothermal effect

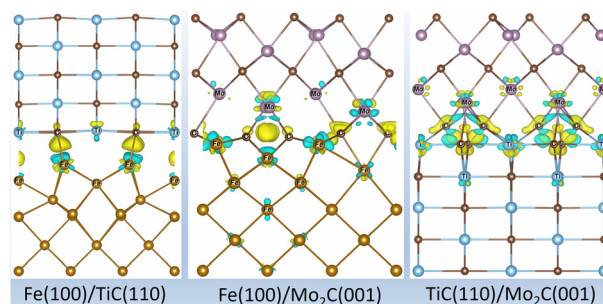
Bo-Yi Chen, Jia-Chi Lan, Mu-Hsuan Tsai, Kyungtaek Lee, Yeong Gwang Khim, In Hak Lee, Young Jun Chang, Ju Han Lee* and Chao-Kuei Lee*



1353

Atomic structures and energetics of heterophase interfaces among Fe(100), TiC(110) and Mo₂C(001) surfaces: insights from first-principles calculations

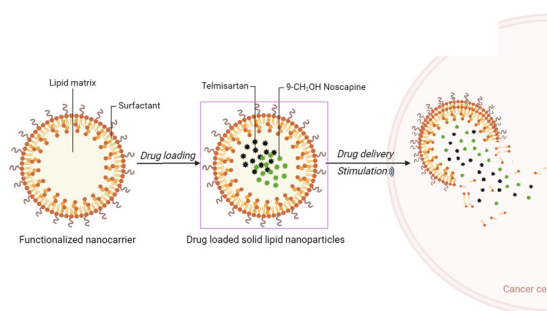
Chol-Jun Yu,* Kyong-A. Rim, Song-Chol Ri, Chol Ryu, Hyok-Bom Yun, Jang-Il Rim and Chol-Song Pang



1364

Assessing dual drug 9-hydroxymethyl noscapine and telmisartan-loaded stearic acid nanoparticles against (H1299) non-small cell lung cancer and their mechanistic interaction with bovine serum albumin

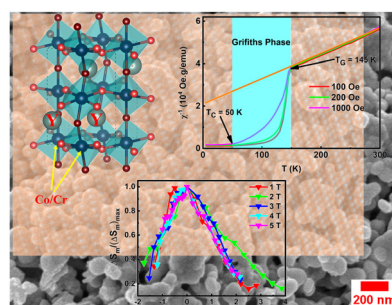
Snigdha Singh,* Shubham Sewariya, Tanya Goel, Sagar Panchal, Aarushi Singh, Shrikant Kukreti, Manisha Tiwari and Ramesh Chandra*



1379

Observation of Griffiths-like phase and magnetocaloric effect in disordered Y₂CoCrO₆ double perovskite

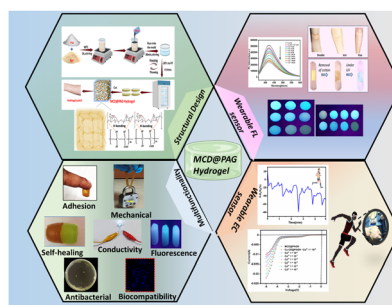
M. A. Islam, Mohasin Tarek, Rimi Rashid, M. A. A. Bally, Ferdous Ara and M. A. Basith*



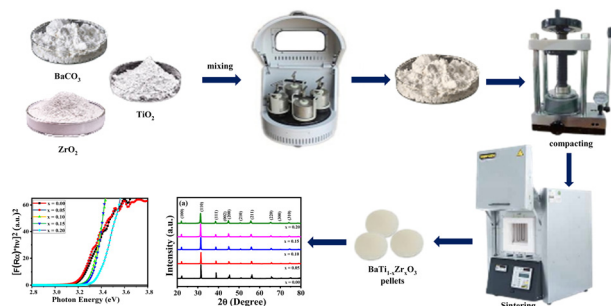
1392

A stretchable PVA–agar hydrogel patch embedded with metal-doped carbon dots (MCD) for monitoring the Ca²⁺ biomarker

Lingaraj Behera and Sasmita Mohapatra*



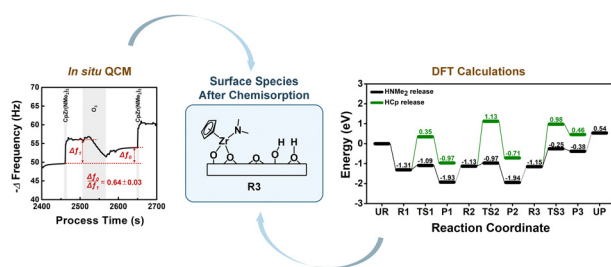
1403



Exploring the effects of zirconium doping on barium titanate ceramics: structural, electrical, and optical properties

Suravi Islam,* Mohammad Robel Molla, Nazia Khatun, Nazmul Islam Tanvir, Mahmuda Hakim and Md. Saidul Islam

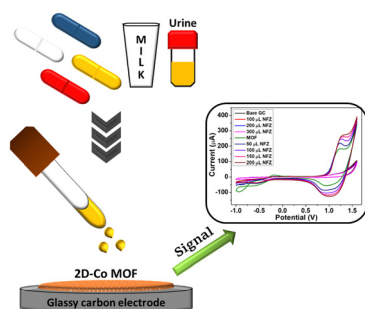
1414



Reaction mechanism of atomic layer deposition of zirconium oxide using tris(dimethylamino)cyclopentadienyl zirconium: experimental and theoretical study

Hye-Lee Kim, Okhyeon Kim, Yong Richard Sriwijaya, Khabib Khumaini, Romel Hidayat and Won-Jun Lee*

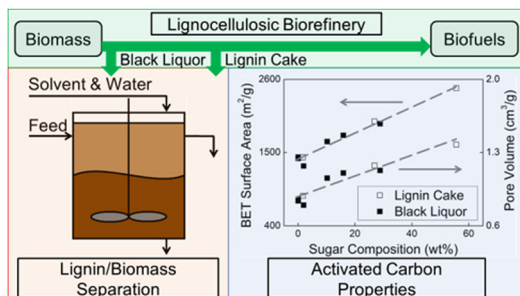
1423



Design and investigation of a new two-dimensional cobalt metal-organic framework for highly sensitive electrochemical detection of the nitrofurazone drug in food and biological samples

T. Leelasree and Himanshu Aggarwal*

1431



Decoupling the role of lignin, cellulose/hemi-cellulose, and ash on ZnCl₂-activated carbon pore structure

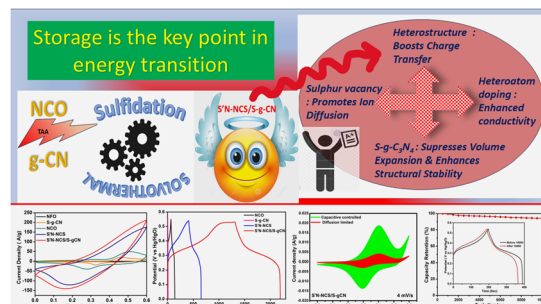
Chengjun Wu, Graham W. Tindall, Carter L. Fitzgerald, Mark C. Thies and Mark E. Roberts*



1442

Deciphering the electrochemical kinetics of sulfur vacancy-assisted nitrogen-doped NiCo₂S₄ combined with sulfur-doped g-C₃N₄ towards supercapacitor applications

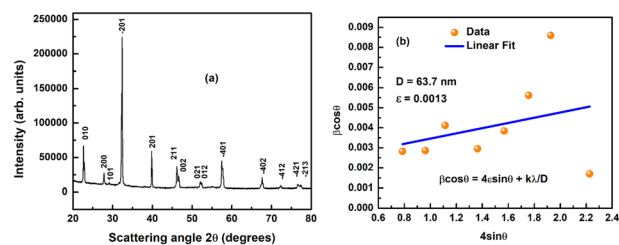
Soumyashree Pany, Amtul Nashim, Ritik Mohanty and Kulamani Parida*



1455

Impedance spectroscopy and optical properties of lanthanum-modified Bi₂FeMnO₆ for NTC thermistor applications

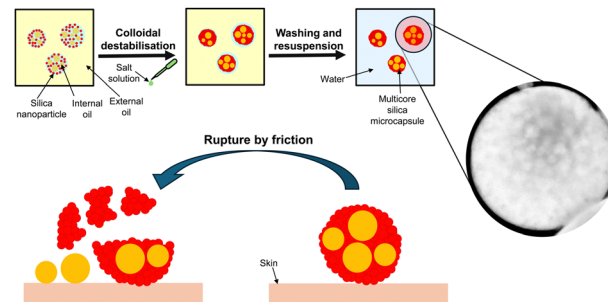
Laxmidhar Sahoo, Swayam Aryam Behera, P. Ganga Raju Achary and S. K. Parida*



1468

Multicore silica microcapsules containing α-tocopherol for potential consumer product applications

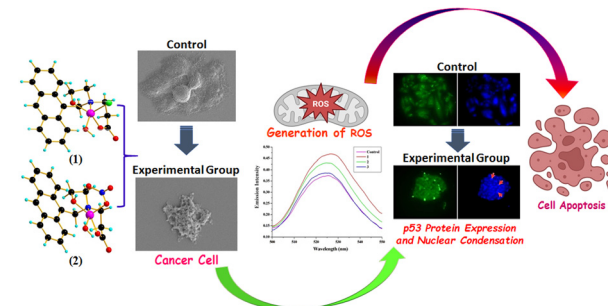
Mohammed Al-Sharabi, Benjamin T. Lobel, Daniele Baiocco, Olivier J. Cayre, Zhibing Zhang and Alexander F. Routh*



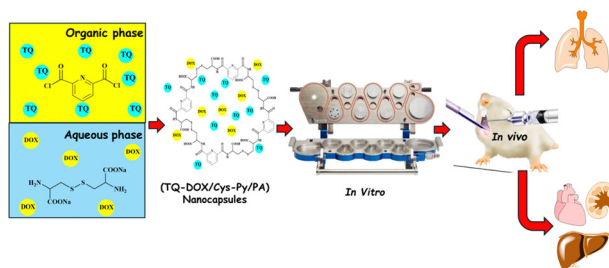
1478

A family of zinc compounds of an anthracene-appended new multifunctional organic scaffold as potent chemotherapeutics against cervical cancer

Sujan Sk, Arnob Chakrovorty, Asmita Samadder and Manindranath Bera*



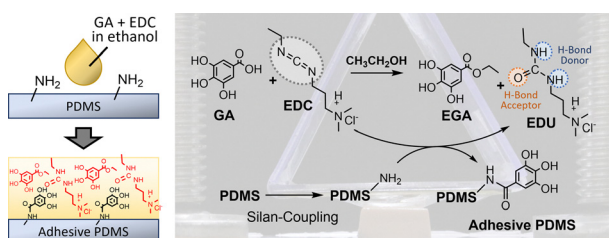
1497



Synthesis and preclinical evaluation of novel L-cystine-based polyamide nanocapsules loaded with a fixed-dose combination of thymoquinone and doxorubicin for targeted pulmonary anticancer drug delivery

Hadeel Fayez Banat, Dalia Khalil Ali, Qais Jarrar, Esra'a Alomary and Eman Zmaily Dahmash*

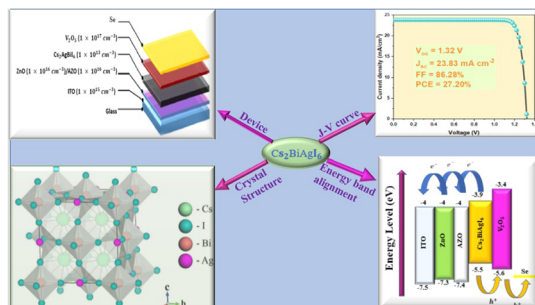
1513



Facile coating of low-molecular-weight stretchable adhesive films leveraging carbodiimide-to-urea conversion and gallic acid for enhanced adhesion

Daiki Sekita, Hajime Fujita, Yosuke Mizuno, Tatsuhiro Horii, Takeshi Hata and Toshinori Fujie*

1520



Achieving 27.20% efficiency for a lead-free double perovskite solar cell with all inorganic Cs₂BiAgI₆ using AZO UTL as a passivation layer

Aminreza Mohandes and Mahmood Moradi*

