

# Materials Advances

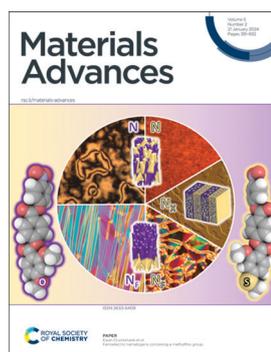
An open access journal publishing across the breadth of materials science

[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.

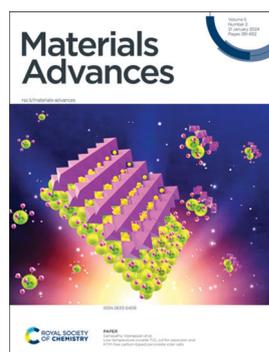
## IN THIS ISSUE

ISSN 2633-5409 CODEN MAADC9 5(2) 381-832 (2024)



### Cover

See Ewan Cruickshank *et al.*, pp. 525-538. Image reproduced by permission of Ewan Cruickshank from *Mater. Adv.*, 2024, 5, 525.



### Inside cover

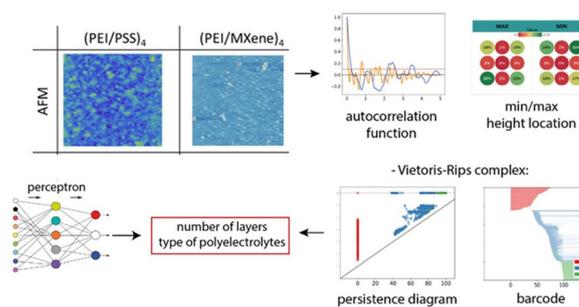
See Ganapathy Veerappan *et al.*, pp. 539-548. Image reproduced by permission of Ganapathy Veerappan and Reshma Dileep K from *Mater. Adv.*, 2024, 5, 539.

## REVIEWS

394

### Layered nanomaterials for renewable energy generation and storage

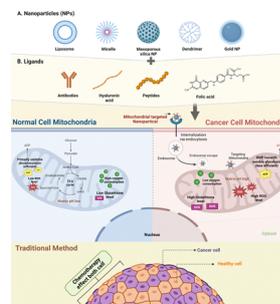
Anna A. Nikitina, Filipp V. Lavrentev, Veronika Yu. Yurova, Daniil Yu. Piarnits, Olga O. Volkova, Ekaterina V. Skorb\* and Dmitry G. Shchukin\*



409

### Circumventing challenges in mitochondrial targeting for cancer treatment: leveraging nanoplatforms for effective solutions

Shivani R. Pandya,\* Harjeet Singh,\* Martin F. Desimone, Jagpreet Singh, Noble George and Srushti Jasani



# RSC Advances

At the heart of open access for  
the global chemistry community

## Editor-in-chief

Russell J Cox

Leibniz Universität Hannover, Germany

## We stand for:



**Breadth** We publish work in all areas of chemistry and reach a global readership



**Affordability** Low APCs, discounts and waivers make publishing open access achievable and sustainable



**Quality** Research to advance the chemical sciences undergoes rigorous peer review for a trusted, society-run journal



**Community** Led by active researchers, we publish quality work from scientists at every career stage, and all countries

Submit your work now

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

@RSC\_Adv



## REVIEWS

432

**Advanced and personalized healthcare through integrated wearable sensors (versatile)**

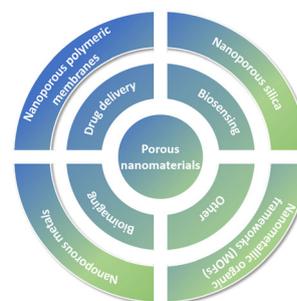
Mayank Garg,\* Arpana Parihar\* and Md. Saifur Rahman



453

**Porous nanomaterials for biosensing and related biological application in *in vitro/vivo* usability**

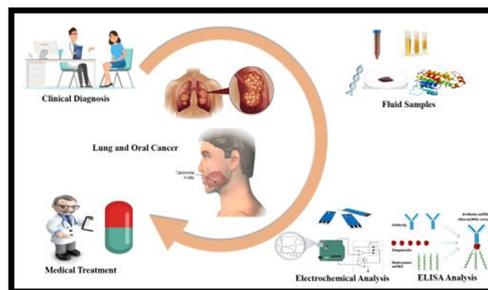
Shaojun Liu, Xiaoxiao He, Xi Hu, Yaoyang Pu and Xiang Mao\*



475

**Recent advancement in the detection of potential cancer biomarkers using the nanomaterial integrated electrochemical sensing technique: a detailed review**

Hema Bhardwaj, Archana, Ashab Noumani, Jayendra Kumar Himanshu, Shreeti Chakravorty and Pratima R. Solanki\*

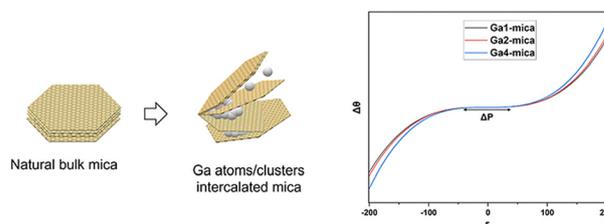


## COMMUNICATIONS

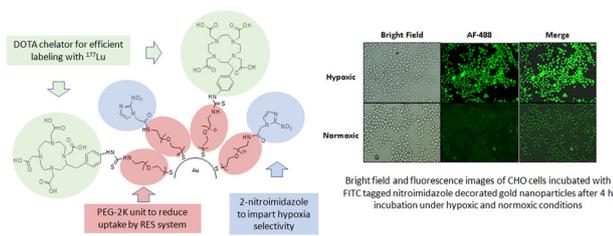
504

**Mica nanosheets synthesized *via* liquid Ga embrittlement: demonstrating enhanced CO<sub>2</sub> capture**

P. Vishakha T. Weerasinghe, Shunnian Wu, W.P. Cathie Lee, Qiang Zhu, Ming Lin and Ping Wu\*



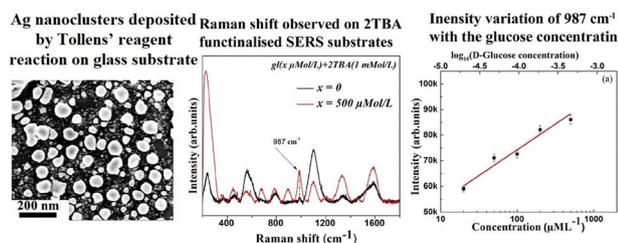
513



## Re-engineered theranostic gold nanoparticles for targeting tumor hypoxia

Sweetey Mittal, Chandan Kumar, Madhava B. Mallia\* and Haladhar Dev Sarma

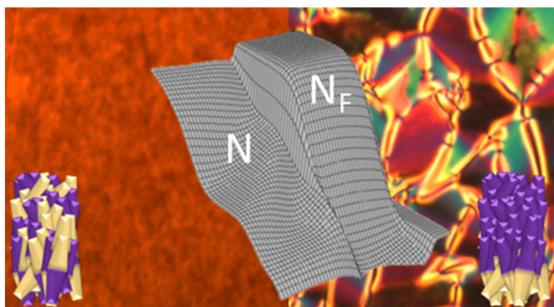
521



## Arresting Tollens' reagent's reaction on a glass surface as the easiest method to fabricate Ag nanocluster-based SERS substrates for glucose sensing

Venkataramanaiah Ingilala, Chandrasahas Bansal, Vadali Venkata Satya Siva Srikanth\* and Rajanikanth Ammanabrolu\*

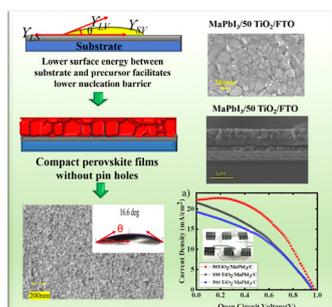
525



## Ferroelectric nanotubes containing a methylthio group

Gytis Stepanafas, Ewan Cruickshank,\* Stevie Brown, Magdalena M. Majewska, Damian Pocięcha, Ewa Gorecka, John M.D. Storey and Corrie T. Imrie

539



## Low-temperature curable TiO<sub>2</sub> sol for separator and HTM-free carbon-based perovskite solar cells

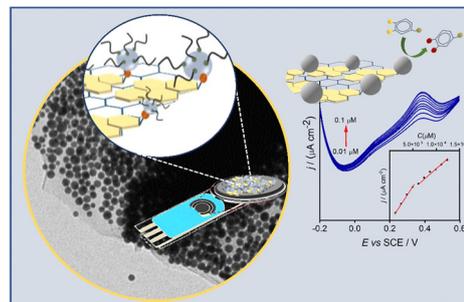
Reshma Dileep K, Thulasi Raman Elumalai, Easwaramoorthi Ramasamy, S. Mallick, T. N. Rao and Ganapathy Veerappan\*



549

### Au nanoparticle decorated reduced graphene oxide and its electroanalytical characterization for label free dopamine detection

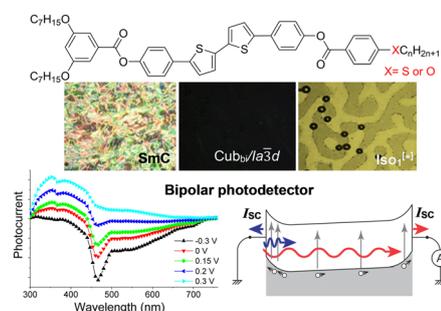
Chiara Ingrosso, Michela Corricelli, Anna Testolin, Valentina Pifferi, Francesca Bettazzi, Giuseppe V. Bianco, Nicoletta Depalo, Elisabetta Fanizza, Marinella Striccoli, Ilaria Palchetti,\* M. Lucia Curri\* and Luigi Falciola\*



561

### Luminescent and photoconductive liquid crystalline lamellar and helical network phases of achiral polycatenars

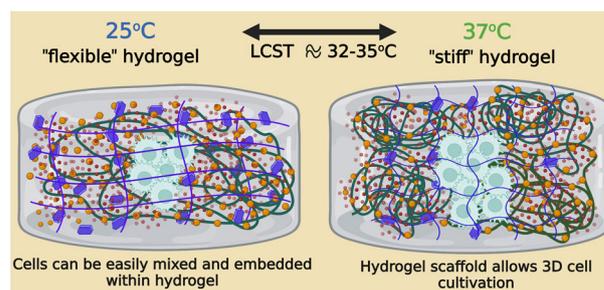
Mohamed Alaasar,\* Ahmed F. Darweesh, Christian Anders, Konstantin Iakoubovskii and Masafumi Yoshio\*



570

### Thermoresponsive and biocompatible poly(*N*-isopropylacrylamide)–cellulose nanocrystals hydrogel for cell growth

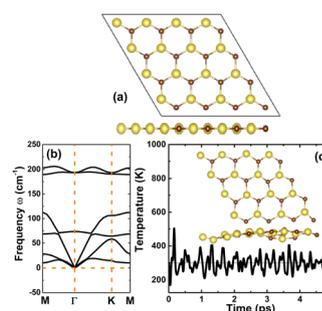
Anna Trubetskaya,\* Jenni Leppiniemi, Sami Lipponen, Salvatore Lombardo, Wim Thielemans, Thaddeus Maloney, Timo Pääkkönen, Kavindra Kumar Kesari, Janne Ruokolainen, Vesa P. Hytönen and Eero Kontturi\*



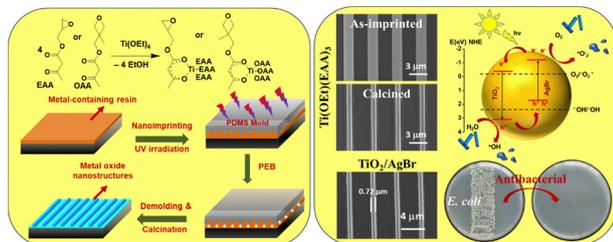
584

### Effects of transition metals and earth alkaline metals in the ionic honeycomb monolayer sodium bromide towards spintronic applications

Vo Van On, J. Guerrero-Sanchez and D. M. Hoat\*



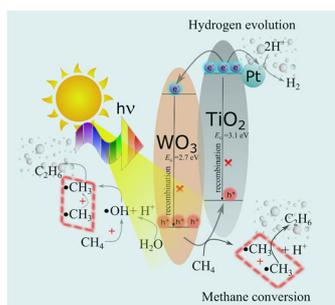
593



### Chemically amplified molecular resins for shrinkage-controlled direct nanoimprint lithography of functional oxides: an application towards dark-light dual-mode antibacterial surfaces

Ravikiran Nagarjuna, Anindita Thakur, Aniket Balapure, Mohammad S. M. Saifullah, Jayati Ray Dutta\* and Ramakrishnan Ganesan\*

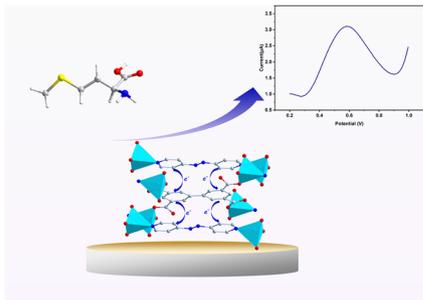
608



### Methane conversion and hydrogen production over TiO<sub>2</sub>/WO<sub>3</sub>/Pt heterojunction photocatalysts

Saulo Amaral Carminati,\* Eliane Ribeiro Januário, Arthur Pignataro Machado, Patrícia Ferreira Silvaino, Jorge Moreira Vaz and Estevam Vitorio Spinacé\*

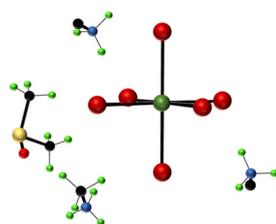
616



### An ancillary-ligand strategy for the improvement of electrochemical sensing towards S-containing amines with ultralow detection limits

Teng Ma, Yizhen Zhao, Xiao Liu, Xingyue He, Bin Lei, Xiao-Hang Qiu,\* Jian-Gong Ma\* and Peng Cheng

625



Increasing bromide concentration

### Band-gap engineering in methylammonium bismuth bromide perovskites for less-toxic perovskite solar cells

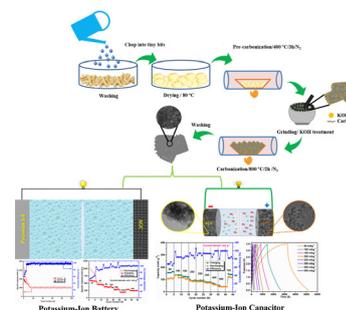
Samuel R. Pering,\* Hunaynah Abdulgafar, Madeleine Mudd, Keith Yendall, Mustafa Togay and Mark R.J. Elsegood



632

### Ginger-derived hierarchical porous carbon as an anode material for potassium-ion batteries and capacitors

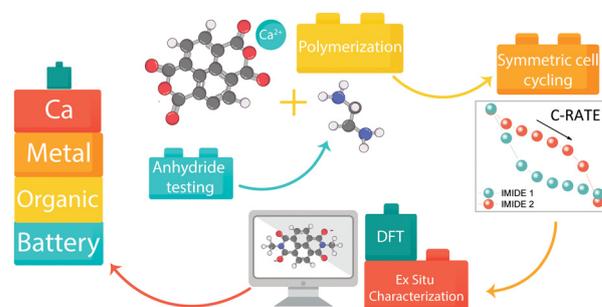
Chandra Sekhar Bongu\* and Chandra Shekhar Sharma



642

### Paving the way for future Ca metal batteries through comprehensive electrochemical testing of organic polymer cathodes

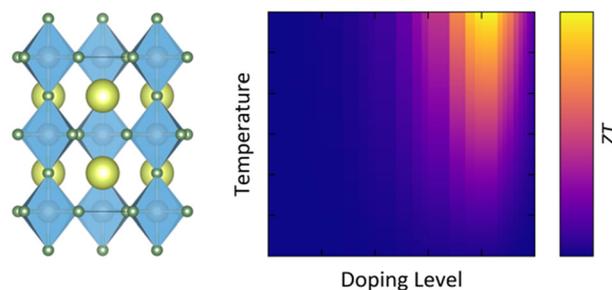
Olivera Lužanin, Anja Kopač Lautar, Tjaša Pavčnik and Jan Bitenc\*



652

### First-principles modelling of the thermoelectric properties of n-type CaTiO<sub>3</sub>, SrTiO<sub>3</sub> and BaTiO<sub>3</sub>

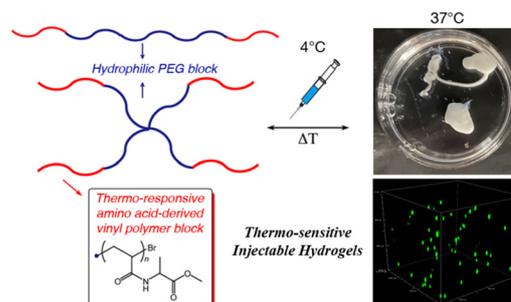
Alveena Z. Khan, Joseph M. Flitcroft and Jonathan M. Skelton\*



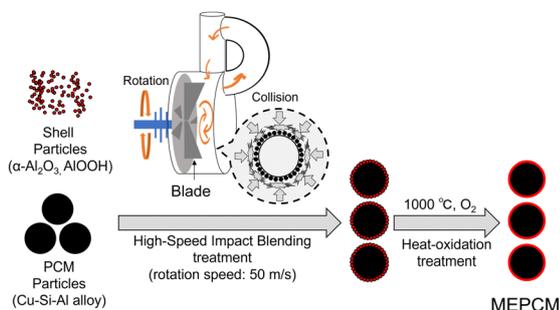
665

### Thermo-responsive injectable hydrogels from linear and star-shaped block copolymers composed of amino acid-derived vinyl polymer and poly(ethylene glycol) for biomedical applications

Mitsuki Nakamura, Shin-nosuke Nishimura,\* Nobuyuki Higashi and Tomoyuki Koga\*



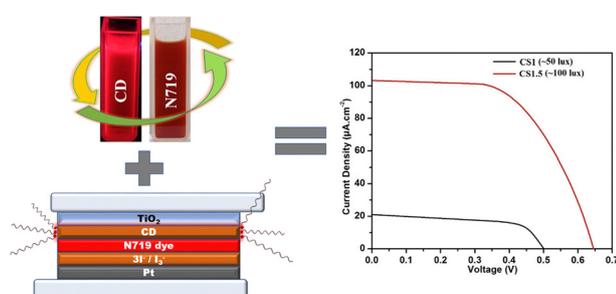
675



### High-temperature ternary Cu–Si–Al alloy as a core–shell microencapsulated phase change material: fabrication via dry synthesis method and its thermal stability mechanism

Masahiro Aoki, Melbert Jeem, Yuto Shimizu, Takahiro Kawaguchi, Minako Kondo, Tomokazu Nakamura, Chihiro Fushimi and Takahiro Nomura\*

685



### Harnessing infrared radiation using carbon dots: photovoltaic devices achieving extraordinary efficiency under faint lighting

Karan Surana, Bhaskar Bhattacharya and Saurabh S. Soni\*

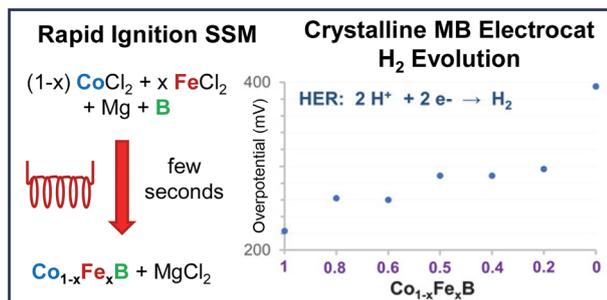
695



### Eco-friendly one-shot approach for producing a functionalized nano-torrefied biomass: a new application of ball milling technology

Aida Kiani, Elena Lamberti, Gianluca Viscusi, Paola Giudicianni, Corinna Maria Grottola, Raffaele Ragucci, Giuliana Gorrasi and Maria Rosaria Acocella\*

705



### Rapid solid-state metathesis reactions for the formation of cobalt–iron monoboride solid-solutions and investigation of their water splitting electrocatalytic activity

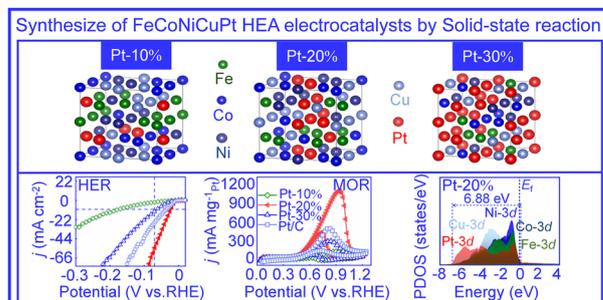
Janaka P. Abeysinghe and Edward G. Gillan\*



719

### Synthesis of FeCoNiCuPt high-entropy alloy nanoparticle electrocatalysts with various Pt contents by a solid-state reaction method

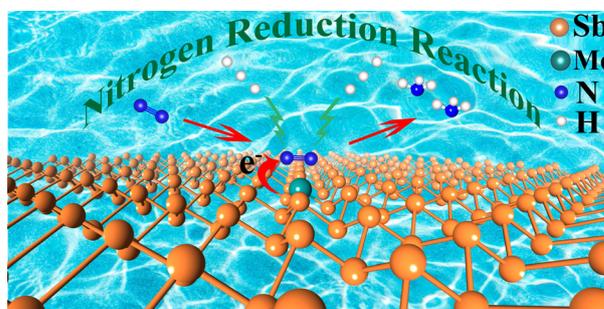
Chao Meng, Xuhui Wang, Zhiyong Li, Chun Wu,\*  
Ling Chang, Runqing Liu and Wenli Pei\*



730

### Single transition atom-doped antimonene as a highly efficient electrocatalyst for the nitrogen reduction reaction: a DFT study

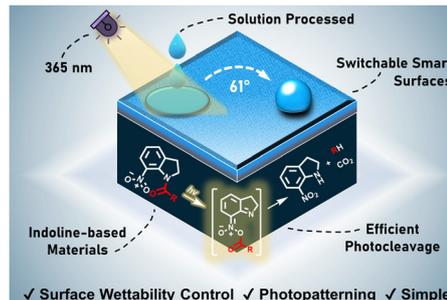
Xiaopeng Shen,\* Chao Liu and Qinfang Zhang\*



741

### Simple photocleavable indoline-based materials for surface wettability patterning

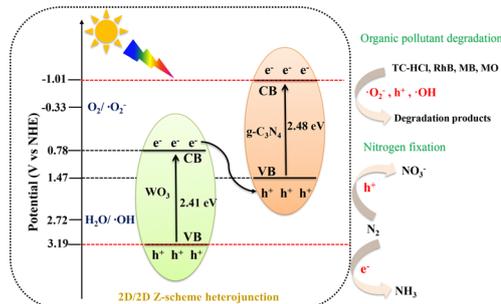
Alex S. Loch, Douglas Cameron, Robert W. Martin,  
Peter J. Skabara and Dave J. Adams\*



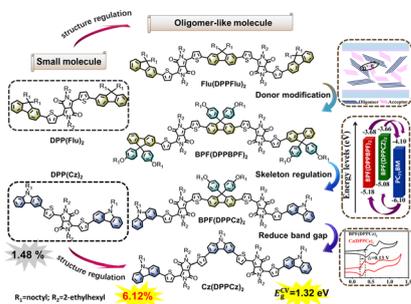
749

### 2D/2D Z-scheme WO<sub>3</sub>/g-C<sub>3</sub>N<sub>4</sub> heterojunctions for photocatalytic organic pollutant degradation and nitrogen fixation

Yasi Li and Junkai Wang\*



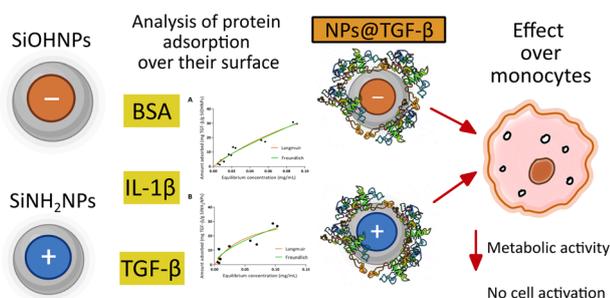
762



### DPP-bridged narrow band gap oligomer-like donor materials: significant effect of molecular structure regulation on photovoltaic performance

Chang Liu, Lunxiang Yin,\* Yanli Guo, Bao Xie, Xu Wang and Yanqin Li\*

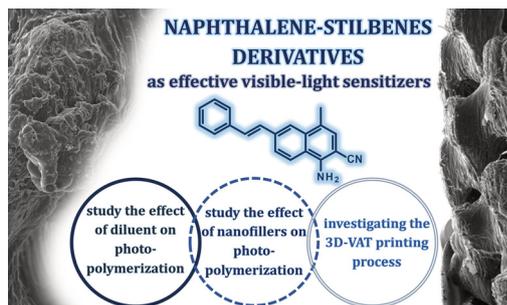
777



### Adsorption of immunomodulatory proteins over silica nanoparticles and the *in vitro* effect

Exequiel David Giorgi, Sofía Genovés, María Eugenia Díaz, Sofía Muncioy, Martín Federico Desimone\* and Mauricio César De Marzi\*

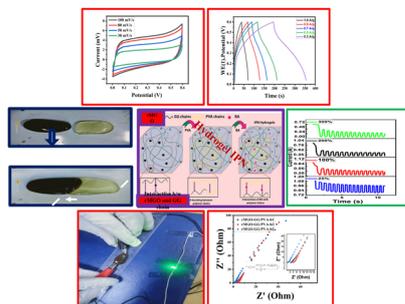
788



### Naphthalene–stilbenes as effective visible-light sensitizers to study the effect of diluent and nanofillers on *in situ* photopolymerization and 3D-VAT printing process

Wiktoria Tomal, Karolina Gatuszka, Petr Lepcio, Maciej Pilch, Anna Chachaj-Brekiesz, Martina Korčušková and Joanna Ortyl\*

806



### Multifunctional and self-healable conductive IPN hydrogels functionalized with reduced magnetite graphene oxide for an advanced flexible all in one solid-state supercapacitor

Tanzil ur Rehman, Luqman Ali Shah\* and Mansoor Khan



820

## Topological data analysis enhanced prediction of hydrogen storage in metal–organic frameworks (MOFs)

Shivanshu Shekhar and Chandra Chowdhury\*

