

# Materials Advances

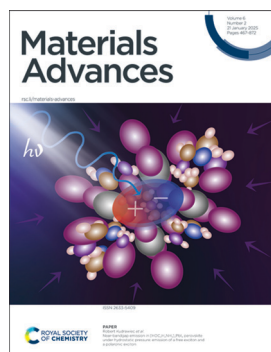
An open access journal publishing across the breadth of materials science

[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(2) 467-872 (2025)



### Cover

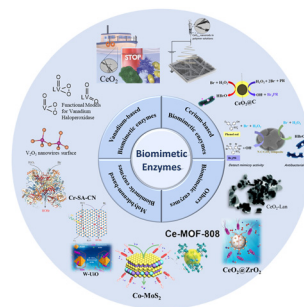
See Robert Kudrawiec  
*et al.*, pp. 569–578.  
Image reproduced  
by permission of  
Robert Kudrawiec  
from *Mater. Adv.*,  
2025, 6, 569.  
Image created by  
Malgorzata Kudrawiec.

## REVIEWS

479

### Biomimetic haloperoxidases for antifouling on the surface of marine materials: a review

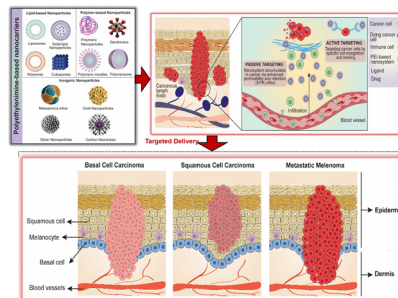
Meinan Yang, Nan Wang,\* Ruiyong Zhang,\*  
Sikandar Khan, Baorong Hou and Wolfgang Sand



490

### Unravelling the potential role of polyethyleneimine (PEI)-based nanosystems in skin cancer therapy

Ajeet Kumar, Sabya Sachi Das,\* Srushti Tambe,  
Babita Kaundal, Sunny Kumar Sarraf and  
Kavindra Kumar Kesari\*



# Royal Society of Chemistry approved training courses

Explore your options.  
Develop your skills.  
Discover learning  
that suits you.

**Courses in the classroom,  
the lab, or online**

Find something for every  
stage of your professional  
development. Search our  
database by:

- subject area
- location
- event type
- skill level

Members **get at least 10% off**

Visit [rsc.li/cpd-training](https://rsc.li/cpd-training)

**SAVE  
10%**

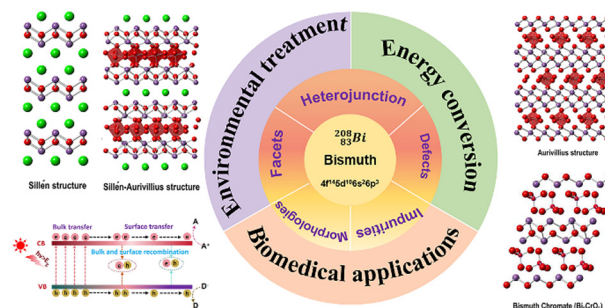


## REVIEWS

508

# One bismuth three benefits: an overview of bismuth-based photocatalysts for energy conversion, environmental treatment and biomedical applications

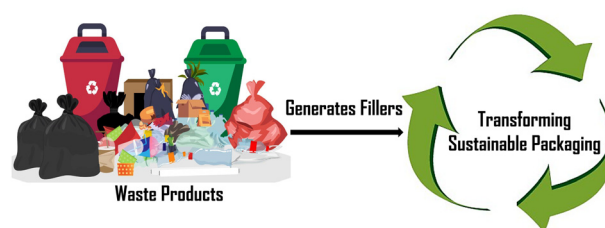
Deng Long, Xinglin Yu, Wentao Li\* and Sihan Ma\*



527

# Trash to treasure: advancing resource efficiency using waste-derived fillers as sustainable reinforcing agents in bioplastics

Zeba Tabassum, Madhuri Girdhar,\* Abhinav Anand, Neelam Kumari, Bhawana Sood, Tabarak Malik,\* Anil Kumar and Anand Mohan

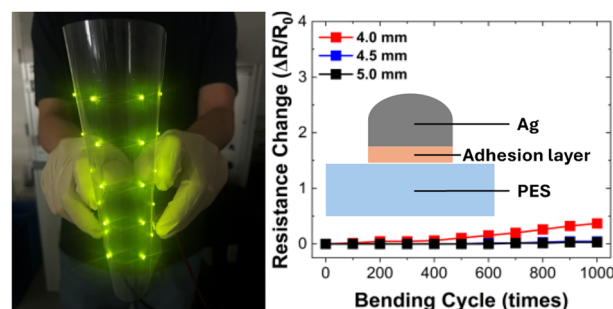


## COMMUNICATIONS

547

# Improved adhesion of printed Ag electrodes for flexible transparent display applications

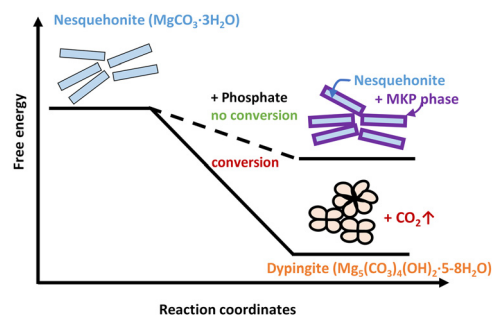
Han-Jung Kim, Se Yong Park, Jeongmin Park, Yohan Ko, Sung Eun Park, Yoonkap Kim and Junhee Kim\*



552

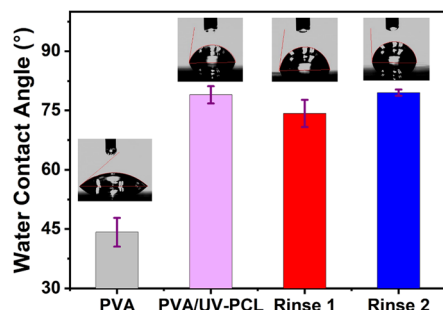
# Stabilization of nesquehonite for application in carbon capture utilization and storage

Nirrupama Kamala Ilango, Hoang Nguyen, Mohammad Alzeer, Frank Winnefeld and Paivo Kinnunen\*



## COMMUNICATIONS

557

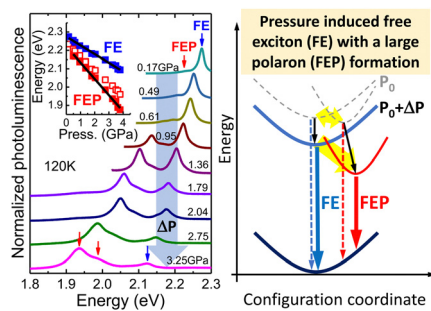


### Cytocompatible, disintegrable, low-voltage operation n-type organic thin film transistors

Mohsin Ali, Bahar Ronnasi, May Ourabi, Joon Hyung Park, Jean-Philippe St-Pierre, Chang-Hyun Kim and Benoît H. Lessard\*

## PAPERS

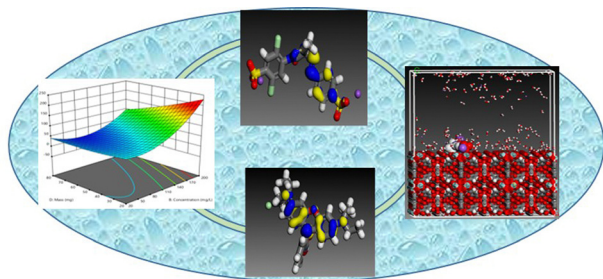
569



### Near-bandgap emission in [HOC<sub>2</sub>H<sub>4</sub>NH<sub>3</sub>]<sub>2</sub>PbI<sub>4</sub> perovskite under hydrostatic pressure: emission of a free exciton and a polaronic exciton

Filip Dybala, Robert Kudrawiec,\* Maciej P. Polak, Artur P. Herman, Adam Sieradzki and Mirosław Mączka

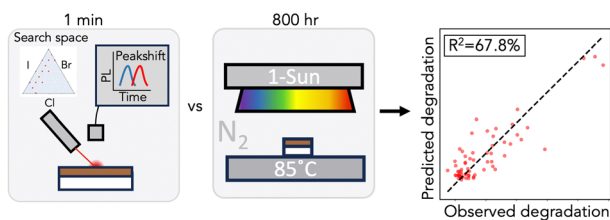
579



### Unraveling the sorption mechanism of industrial dyes onto Zr-based MOFs: computational and experimental modelling for highly efficient removal

Kora Lucretse Tiemo Nguena,\* Cyrille Ghislain Fotsop, Aurelien Bopda, Donald Raoul Tchuifon Tchuifon, Fredy Harcel Kamgang Djioko, Alvine Mirabelle Soukoua Nguéabouo, Chinyere Ada Madu, Fabian I. Ezema and Emeka Emmanuel Oguzie\*

598



### Bayesian optimization and prediction of the durability of triple-halide perovskite thin films under light and heat stressors

Deniz N. Cakan, Eric Oberholtz, Ken Kaushal, Sean P. Dunfield and David P. Fenning\*

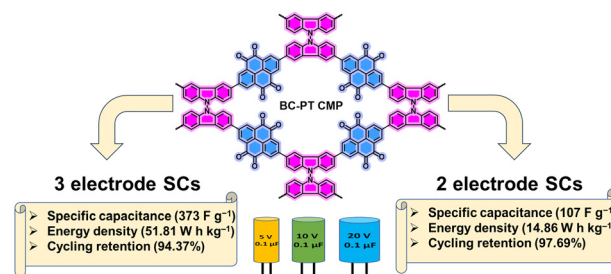




607

## Engineering carbonyl-rich conjugated microporous polymers with a pyrene-4,5,9,10-tetraone building block as highly efficient and stable electrodes for energy storage

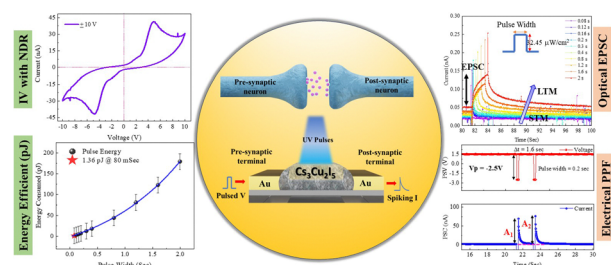
Ahmed F. Saber, Ya-Fan Chen, Levannie Mabuti, Swetha V. Chaganti, Santosh U. Sharma, Johann Lüder, Jyh-Tsung Lee, Shiao-Wei Kuo and Ahmed F. M. EL-Mahdy\*



617

## A low-energy consuming, optically and electrically stimulated artificial synapse based on lead-free metal halide perovskite (Cs<sub>3</sub>Cu<sub>2</sub>I<sub>5</sub>) for neuromorphic applications

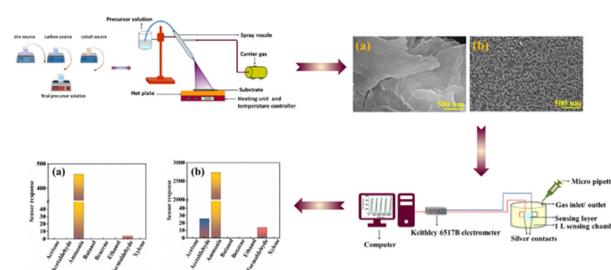
Amrita Bharati Mishra, Mrunal Shete and R. Thamankar\*



629

## Carbon and cobalt co-doped ZnO thin films for highly sensitive and selective ammonia detection at room temperature

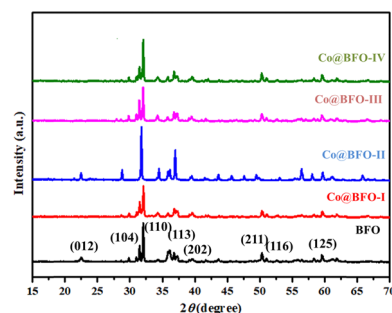
Anju Thomas and Kalainathan Sivaperuman\*



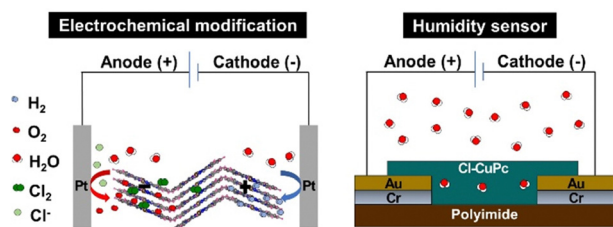
641

## A multifunctional Co-doped BiFeO<sub>3</sub> nanocomposite: a promising candidate for photocatalytic degradation, antibacterial activity, and antioxidant applications

Devender Jalandhara, Sanjeev Kumar,\* Jasvir Dalal, Supreet, Gautam Singh, Sandeep Kumar, Rahul Badru, Yadvinder Singh, Satya Vir Sharma\* and Sandeep Kaushal\*



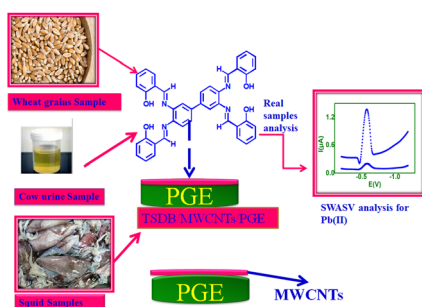
658



### Halide-mediated electrochemical modification of copper phthalocyanine for humidity sensing applications

Busarakham Ngokpho, Pattanaphong Janphuang, Supinya Nijpanich, Narong Chanlek, Suttipong Wannapaiboon, Theeranun Siritanon and Kamonwad Ngamchuea\*

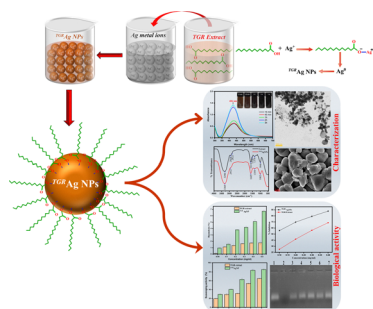
670



### Analysis of Pb(II) in wheat grain, cow urine and squid samples using modified novel TSDB incorporated MWCNTs

Jayagopi Gayathri,\* Sivakumar Sivalingam and Kumar Sangeetha Selvan\*

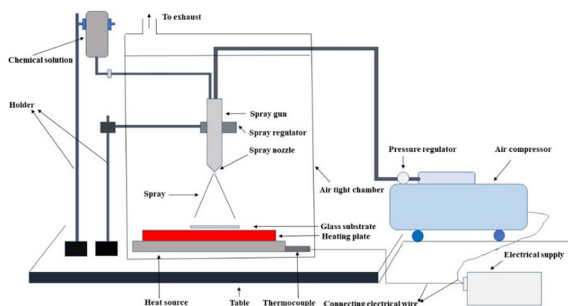
682



### Green synthesis of biocompatible silver nanoparticles using *Trillium govanianum* rhizome extract: comprehensive biological evaluation and *in silico* analysis

Syed Ifrah Manzoor, Farhat Jabeen, Rajan Patel, M. Moshahid Alam Rizvi, Khalid Imtiyaz, Maqsood Ahmad Malik\* and Tanveer A. Dar\*

703



### Effect of silver and cobalt on transparent conducting CdO thin films: tuning the optoelectronic properties

Ishraque Karim, M. Ashikul Haque Naeem,\* Ahmed Sidrat Rahman Ayon, Md. Abdus Sattar, Md. Abdus Sabur\* and Aninda Nafis Ahmed

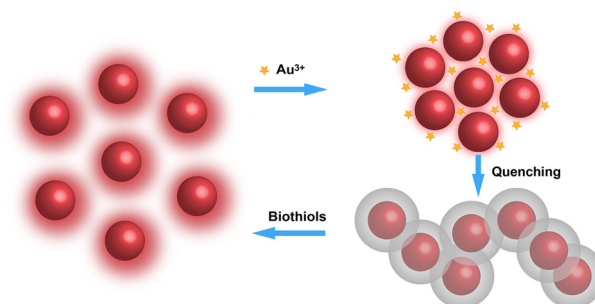


## PAPERS

719

## Carbon dot based fluorescent “on–off–on” assays for the determination of Au(III) ions and biothiols

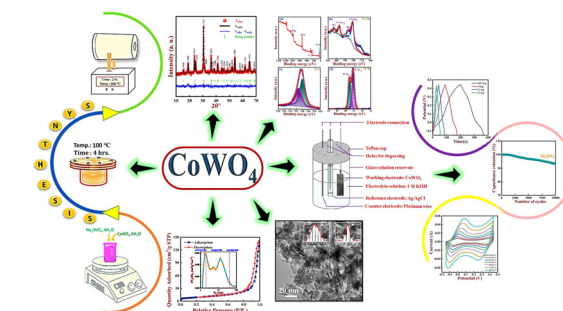
Zhenzhen Guo, Jinwen Zhu, Yue Huang, Jibin Liu\* and Peng Miao\*



726

Low-temperature synthesis of oval-shaped CoWO<sub>4</sub> nanomaterials for enhanced asymmetric supercapacitor performance

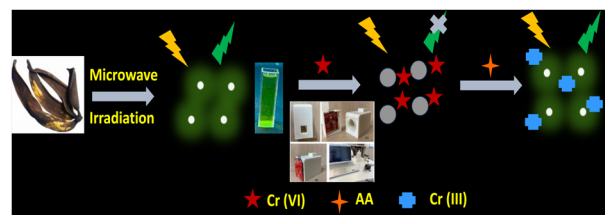
Pruthvi B. Patel, Dharti Patel, Anita R. Patel, Sanjay N. Bariya, Yash G. Kapdi, Vanaraj Solanki, Saurabh S. Soni\* and Mitesh H. Patel\*



743

## A portable microcontroller-enabled spectroscopy sensor module for the fluorometric detection of Cr(VI) and ascorbic acid, utilizing banana peel-derived carbon quantum dots as versatile nanoprobes

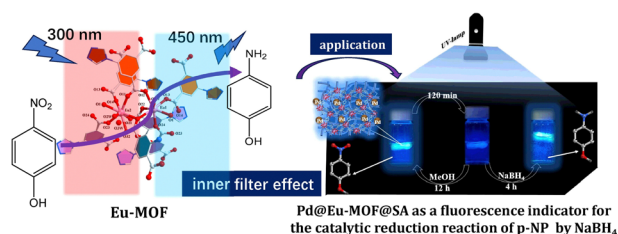
Aayushi Kundu,\* Jobanpreet Brar, Amit Mishra, Banibrata Maity\* and Soumen Basu\*



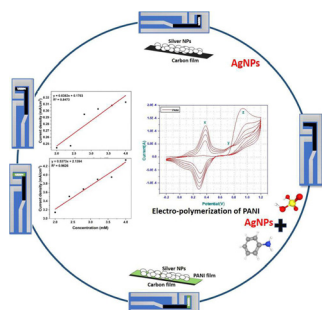
756

Eu-MOF and its composites as turn-off fluorescence sensors for *p*-nitrophenol with applications in monitoring catalytic reduction reactions

Bing-Bing Xing, Yue-Shu Wang, Tao Zhang, Jing-Yi Liu, Huan Jiao and Ling Xu\*



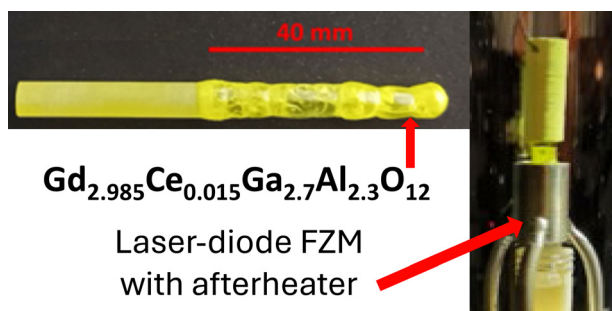
766



### Development of a silver–polyaniline functionalized biosensor for non-enzymatic lactic acid detection

Vinay Kishnani, Rahul Ashvinbhai Makadia, Satheesh Natarajan, Jayaraj Joseph and Ankur Gupta\*

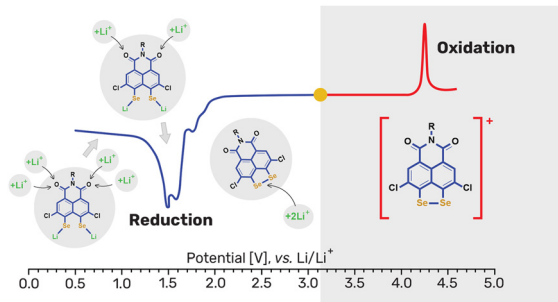
777



### A fast GGAG:Ce(Mg) single crystal scintillator: LDFZM growth, characterization and electronic band structure calculation

František Zajíc,\* Vítězslav Jarý, Jiří Pospíšil, Pavel Boháček, Zafari Umar, Michal Piasecki, Mikhail G. Brik, Romana Kučerková, Alena Beitlerová and Martin Nikl\*

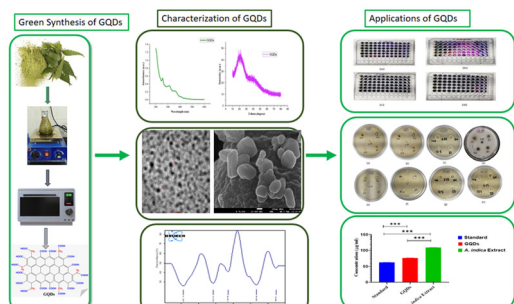
788



### peri-Diselenolo-substituted 1,8-naphthalimide derivatives as bipolar matrices for redox reactions in a non-aqueous electrolyte

Delyana Marinova,\* Lyuben Borislavov, Silva Stanchovska, Rositsa Kukeva, Monika MUTOVSKA, Natali Simeonova, Stanimir Stoyanov, Yulian Zaganyarski,\* Mihail Mondeshki, Yanislav Danchevski, Hristo Rashev, Alia Tadjer and Radostina Stoyanova

805



### Microwave-assisted green synthesis of fluorescent graphene quantum dots (GQDs) using *Azadirachta indica* leaves: enhanced synergistic action of antioxidant and antimicrobial effects and unveiling computational insights

Pooja Kadyan, Manish Kumar, Aisha Tufail, Andrea Ragusa,\* Sudhir Kumar Kataria\* and Amit Dubey\*



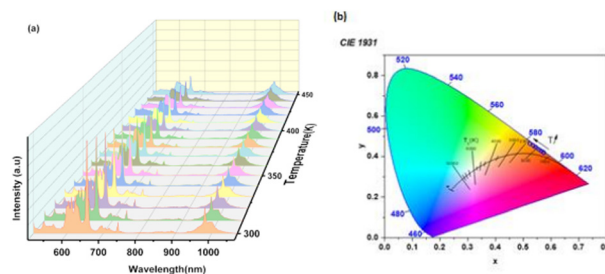


## PAPERS

827

# Ultra-high-sensitive temperature sensing based on emission $\text{Pr}^{3+}$ and $\text{Yb}^{3+}$ codoped $\text{Y}_2\text{Mo}_3\text{O}_{12}$ nanostructures

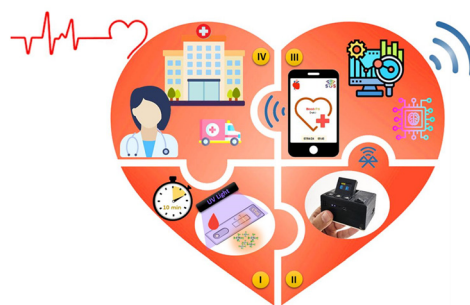
Nozha Ben Amar, Kamel Saidi,\*  
Christian Hernández-Álvarez,  
Mohamed Dammak\* and  
Inocencio R. Martín



839

# Smart early diagnosis of acute myocardial infarction: a ZIF-based nanofluorescence lateral flow immunoassay for point-of-care detection of cTnI

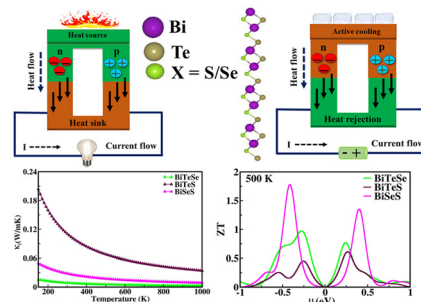
Zahra Mirzaeizadeh, Emadoddin Amin Sadrabadi,  
Neda Naseri, Hamed Golmohammadi\* and  
Kobra Omidfar\*



849

# Thermoelectric performance of Bi-based novel Janus monolayer structures

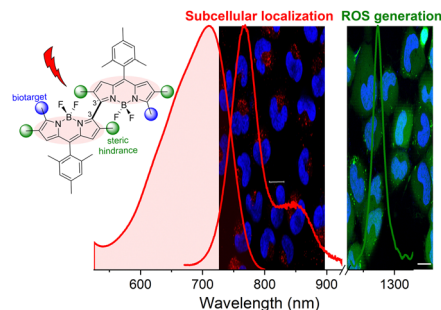
KM Sujata, Nidhi Verma, Rekha Garg Solanki\* and  
Ashok Kumar\*



860

# Heavy-atom-free BODIPY-based photodynamic therapy agents activated at long wavelengths

Jennifer Soler-Beatty, Edurne Avellanal-Zaballa,  
Gonzalo Durán-Sampedro, Alba García-Fernández,  
Antonia R. Agarrabeitia, Jorge Bañuelos,\*  
Ramón Martínez Mañez\* and María J. Ortiz\*



## CORRECTION

870

**Correction: Study of self-assembly of mixed-ligand metal–organic cages by high-resolution mass spectrometry**

Kang Tong, Jia Jia,\* Rongfu Huang and Jin Luo

