

# Dalton Transactions

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## IN THIS ISSUE

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### Cover

See Jun Qin, Xiaolang Chen  
*et al.*, pp. 4412–4425.

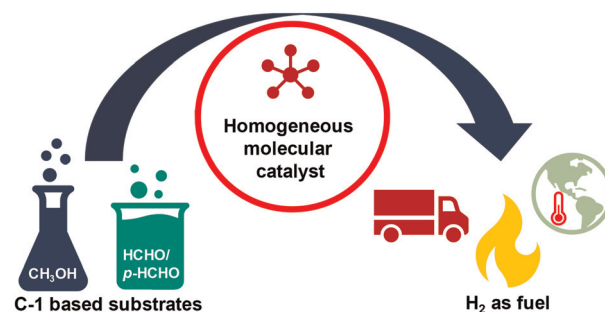
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*Dalton Trans.*, 2024, **53**,  
4412.

## PERSPECTIVE

4363

### Recent progress in molecular transition metal catalysts for hydrogen production from methanol and formaldehyde

Jayashree Parthiban, Mahendra K. Awasthi,  
Tushar A. Kharde, Khanindra Kalita and  
Sanjay Kumar Singh\*

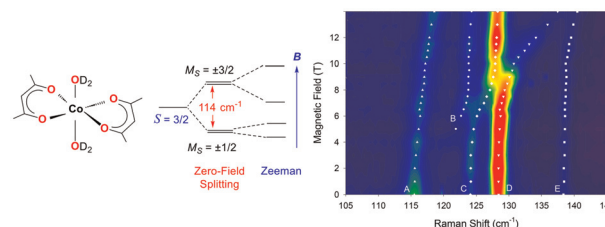


## FRONTIER

4390

### Spectroscopic techniques to probe magnetic anisotropy and spin–phonon coupling in metal complexes

Adam T. Hand, Brandon D. Watson-Sanders and  
Zi-Ling Xue\*



# Environmental Science: Atmospheres

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Fundamental questions  
Elemental answers



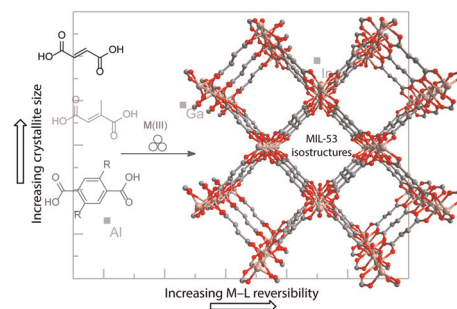


## COMMUNICATION

4406

### Facile mechanochemical synthesis of MIL-53 and its isorecticular analogues with a glance at reaction reversibility

Fillipp Edvard Salvador, Zhuorigebatu Tegudeer, Halie Locke and Wen-Yang Gao\*

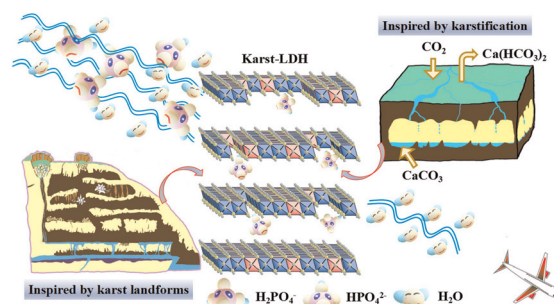


## PAPERS

4412

### A karst-inspired hierarchical Mg/Al layered double hydroxide with a high entropy-driven process for interception and storage

Hongyu Shi, Jun Qin,\* Qing Lv, Lijin Zhang, Qingxin Li, Bin Ou and Xiaolang Chen\*



4426

### One-pot gram-scale rapid synthesis of MN<sub>4</sub> complexes with 14-membered ring macrocyclic ligand as a precursor for carbon-based ORR and CO<sub>2</sub>RR catalysts

Mana Ogawa, Sayaka Usami, Ryo Takahama, Kazuko Iwamoto, Tomomi Nabeta, Shin Kawashima, Ryoichi Kojima, Junya Ohyama, Teruaki Hayakawa, Yuta Nabae\* and Makoto Moriya\*

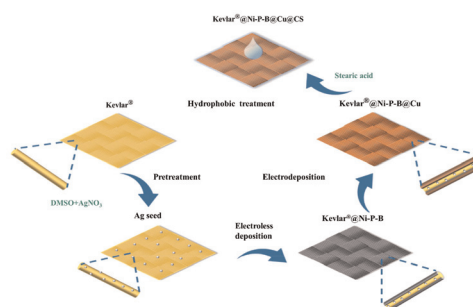


**MN<sub>4</sub>-type complexes with 14 membered ring:  
One-pot, gram-scale synthesis**

4432

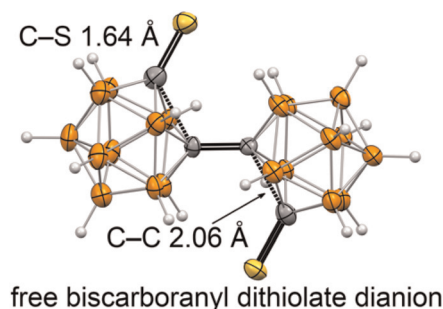
### Fabrication of highly conductive, flexible, and hydrophobic Kevlar®@Ni-P-B@Cu@CS fabric with excellent self-cleaning performance for electromagnetic interference shielding

Qinsi Shao,\* Hao Wang, Leilei Zhang, Xihai Wang, Hengxin Zhang, Ruicheng Bai\* and Hongshan Fu\*



## PAPERS

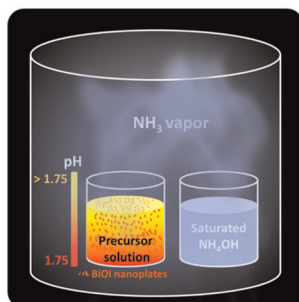
4444



### Synthesis and cluster structure distortions of biscarborane dithiol, thioether, and disulfide

Jared R. Riffle, Tyler M. Hemingway, Mark D. Smith and Dmitry V. Peryshkov\*

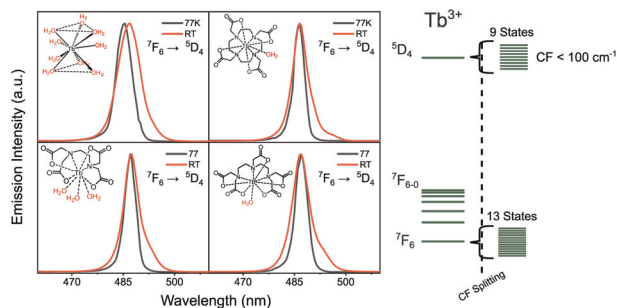
4451



### A novel method for preparing BiOI nanoplates and their use as precursors to synthesize porous BiVO<sub>4</sub> water oxidation photocatalysts

Hoang V. Le, Duc N. Nguyen, Quyen T. Nguyen, Ly T. Le and Phong D. Tran\*

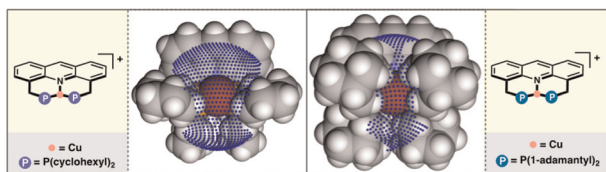
4461



### Mapping the distribution of electronic states within the <sup>5</sup>D<sub>4</sub> and <sup>7</sup>F<sub>6</sub> levels of Tb<sup>3+</sup> complexes with optical spectroscopy

Nicolaj Kofod,\* Margrete Juel Henriksen and Thomas Just Sørensen\*

4471



### Acridine-based copper(I) PNP pincer complexes: catalysts for alkyne hydroboration and borylation of aryl halides

Angus Olding, Nigel. T. Lucas, Curtis C. Ho\* and Alex C. Bissember\*



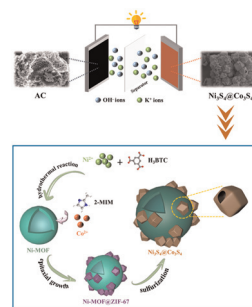


## PAPERS

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### Hollow $\text{Ni}_3\text{S}_4@\text{Co}_3\text{S}_4$ with core–satellite nano-structure derived from metal–organic framework (MOF)-on-MOF hybrids as an electrode material for supercapacitors

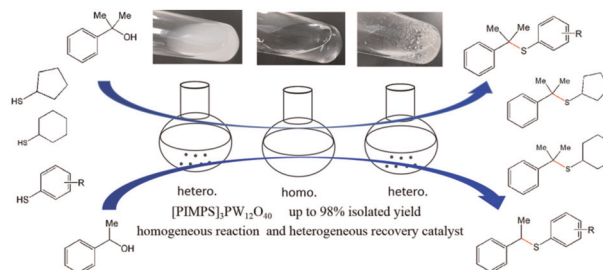
Jiaxi Xu, Hao Guo,\* Mingyue Wang, Yanrui Hao, Jiaying Tian, Henglong Ren, Yinsheng Liu, Borong Ren and Wu Yang\*



4492

### Polyoxometalate-based ionic liquids: efficient reversible phase transformation-type catalysts for thiolation of alcohols to construct C–S bonds

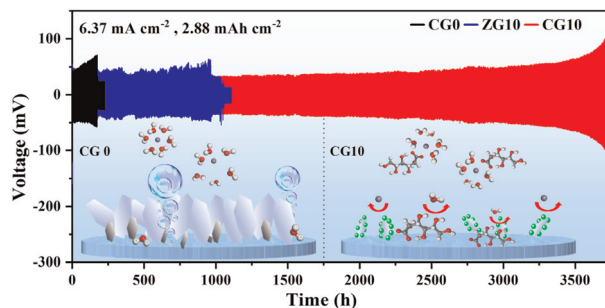
Jikun Li, Junwei Ma, Chuanping Wei, Zebao Zheng, Yinfeng Han,\* Huiping Wang, Xueshen Wang and Changwen Hu\*



4501

### Employing a chelating agent as electrolyte additive with synergistic effects yields highly reversible zinc metal anodes

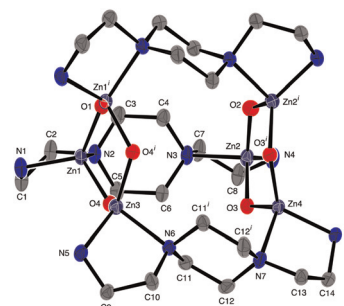
Ziwen Feng, Yu Zhang, Lingmin Yao,\* Qinglin Deng,\* Yipeng Tan, Yang Zhao, Zelin Li and Linfei Lu



4512

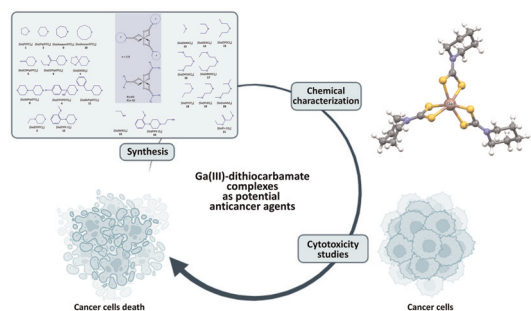
### Anticancer, antioxidant, and antimicrobial studies and molecular docking of a new hexanuclear Zn(II) complex, together with its X-ray crystal analysis

Hassan Keypour,\* Hamid Zeynali, Hojatollah Fatemikia, Nika Ranjbar, Roya Karamian, Mohammad Taher Rezaei and Robert William Gable



## PAPERS

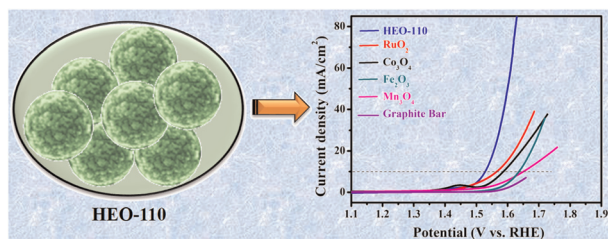
4526



### Synthesis, characterization and *in vitro* cytotoxicity of gallium(III)-dithiocarbamate complexes

Nicola Salvatore\*, Nicolò Morellato, Carolina Gobbi, Valentina Gandin, Michele De Franco, Cristina Marzano, Alessandro Dolmella and Cristina Bolzati\*

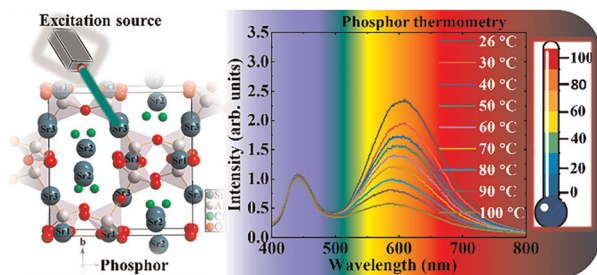
4544



### Low-temperature synthesis of high-entropy amorphous metal oxides (HEOs) for enhanced oxygen evolution performance

Arpeeta Hota, Jiban K. Das\*, Prasanna K. Panda, Asim A. Mohammed, Avijit Biswal, Benadict Rakesh and B. C. Tripathy\*

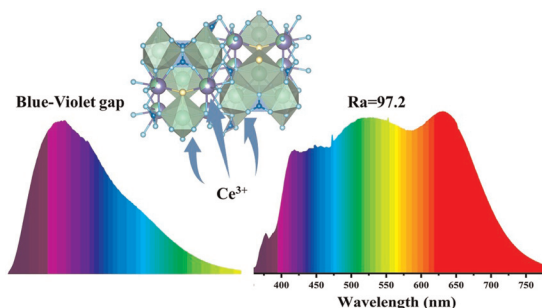
4551



### Effect of annealing conditions on the luminescence properties and thermometric performance of Sr<sub>3</sub>Al<sub>2</sub>O<sub>5</sub>Cl<sub>2</sub>:Eu<sup>2+</sup> and SrAl<sub>2</sub>O<sub>4</sub>:Eu<sup>2+</sup> phosphors

Simon N. Ogugua\*, Christopher Abram, Benoît Fond, Robin E. Kroon, Frank Beyrau and Hendrik C. Swart\*

4564



### An efficient blue–violet phosphor: an advanced material designed for high-quality full-spectrum lighting

Xiudi Wu, Yonghui Xu, Shuwen Yin, Chuansheng Zhong, Xibao Zhang, Liang Zhou\* and Hongpeng You\*

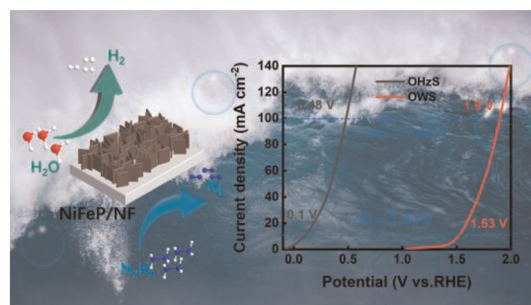


## PAPERS

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### NiFeP nanosheets for efficient and durable hydrazine-assisted electrolytic hydrogen production

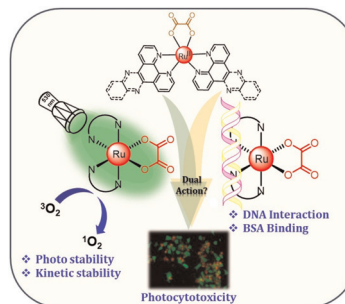
Jinxing Hou, Kaifeng Mei, Tongtong Jiang, Xinxin Yu\* and Mingzai Wu\*



4580

### Photocytotoxic kinetically stable ruthenium(II)-*N,N*-donor polypyridyl complexes of oxalate with anticancer activity against HepG2 liver cancer cells

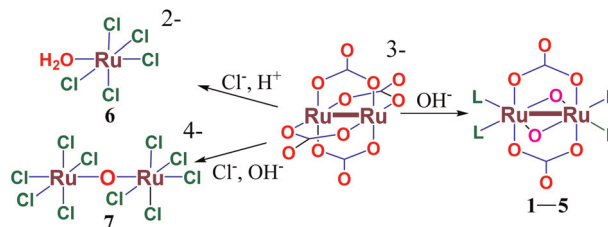
Juhi Sayala, Ekta Srivastava, Priyaranjan Kumar, Nitin Shukla, Ashok Kumar and Ashis K. Patra\*



4598

### Edge-sharing bi-octahedral diruthenium(IV,IV) compounds containing Ru–Ru bonds chelated and bridged by two carbonate and two oxo groups

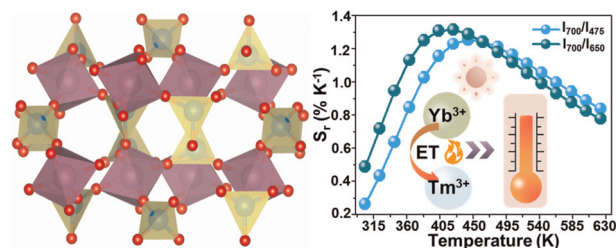
Yu-Ru He, Mi Zhang, Wen-Hui Huang, Xiang-Xian Xue, Zi-Qin Zhou, Li-Na Feng, Jian-Hui Yang and Bin Liu\*



4607

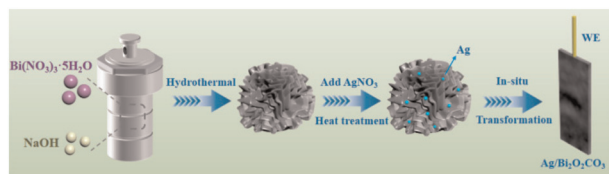
### Regulating the upconversion luminescence properties of Tm<sup>3+</sup>/Yb<sup>3+</sup>-codoped ZrScW<sub>2</sub>PO<sub>12</sub> microparticles with a negative thermal expansion effect through thermal stimulation for optical thermometry

Xiaoqing Lai, Przemysław Woźny, Marcin Runowski,\* Laihui Luo and Peng Du\*





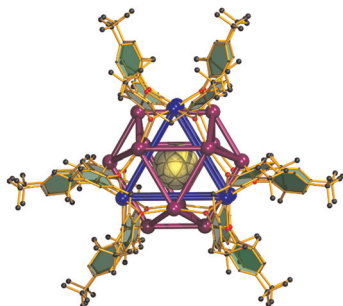
4617



### Highly selective electrocatalytic reduction of CO<sub>2</sub> to HCOOH over an *in situ* derived Ag-loaded Bi<sub>2</sub>O<sub>2</sub>CO<sub>3</sub> electrocatalyst

Wei Zheng, Changlai Wang, Jing Chen, Shi Chen, Zhiyu Lin, Minxue Huang, Hao Huang, Yafei Qu, Peichen Wang, Lin Hu\* and Qianwang Chen\*

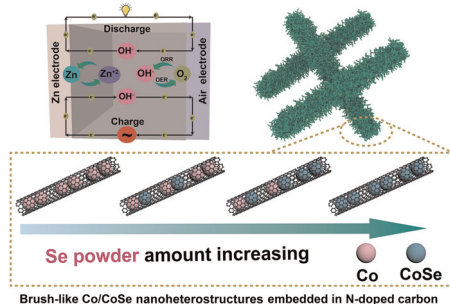
4624



### Tandem templating strategies facilitate the assembly of calix[8]arene-supported Ln<sub>18</sub> clusters

Yushu Jiao, Sergio Sanz,\* Jan van Leusen, David Gracia, Angelos B. Canaj, Marco Evangelisti,\* Euan K. Brechin,\* Scott J. Dalgarno\* and Paul Kögerler\*

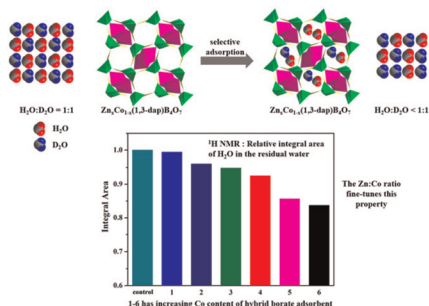
4631



### Brush-like Co/CoSe nanoheterostructures embedded in N-doped carbon for rechargeable Zn–air batteries

Teng Luo, Shengxi Lei, Pan Qi, Shuai Niu, Zhiwei Li, Hao Luo\* and Dawei Zhang\*

4637



### Co<sup>(III)</sup>-doped hybrid Zn<sup>(III)</sup> tetraborate complexes, [Zn<sub>x</sub>Co<sub>(1-x)</sub>(1,3-dap)B<sub>4</sub>O<sub>7</sub>] (1,3-dap = 1,3-diaminopropane): BET analysis and N<sub>2</sub>/H<sub>2</sub>O/D<sub>2</sub>O adsorption studies

Lei Liu, Chun-Yang Pan,\* Yong He, Li-Juan Zhong and Michael A. Beckett

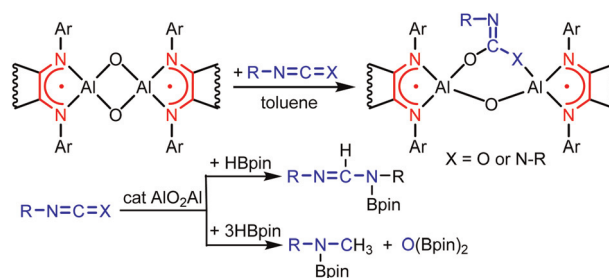


## PAPERS

4643

## Diversity of transformation of heteroallenes on acenaphthene-1,2-diimine aluminum oxide

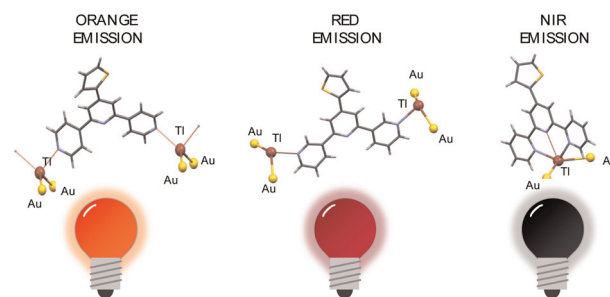
Tatyana S. Koptseva, Alexandra A. Skatova, Mikhail V. Moskalev, Roman V. Rumyantsev and Igor L. Fedushkin\*



4652

## Terpyridine isomerism as a tool for tuning red-to-NIR emissive properties in heteronuclear gold(i)–thallium(i) complexes

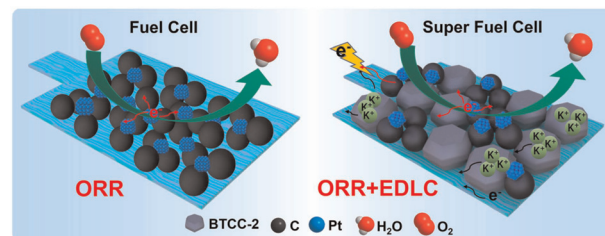
David Royo, Sonia Moreno, María Rodríguez-Castillo, Miguel Monge, M. Elena Olmos,\* Fedor I. Zubkov, Anastasia A. Pronina, Ghodrat Mahmoudi\* and José M. López-de-Luzuriaga\*



4662

## Al-MOF-derived porous carbon-modified Pt/C catalyst for constructing a high-performance super fuel cell via an ORR + EDLC parallel-discharge mechanism

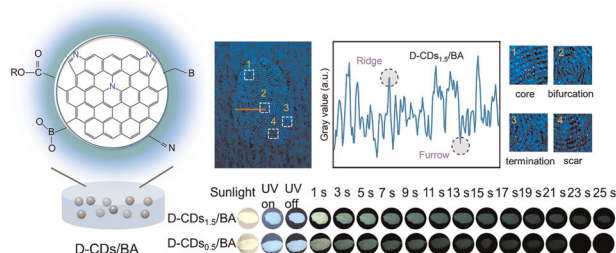
Jianjun Zhao, Nana Liu, Yanzhi Sun and Junqing Pan\*



4671

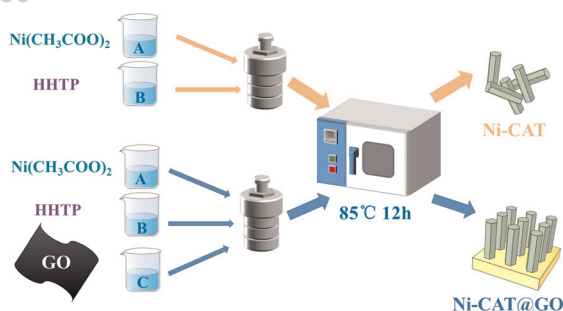
## Ultralong afterglow of heavy-atom-free carbon dots with a phosphorescence lifetime of up to 3.7 s for encryption and fingerprinting description

Xinlei Zhang, Xia Liu, Peng Liu, Bohan Li and Yan Xu\*



## PAPERS

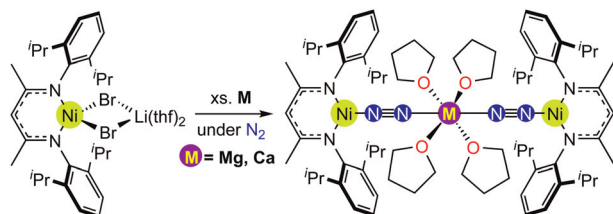
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### Morphology regulation of conductive metal–organic frameworks *in situ* grown on graphene oxide for high-performance supercapacitors

Haoliang Zhang, Lan Yang, Xu Li, Yunjie Ping, Jinzhao Han, Si Chen and Chunqing He\*

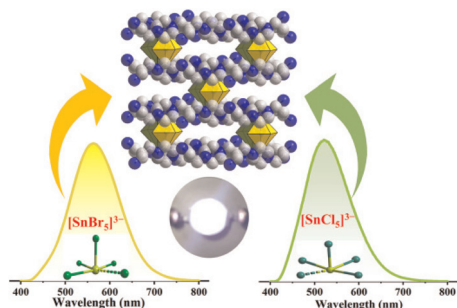
4689



### Alkaline earth metal-assisted dinitrogen activation at nickel

Theresa Knoell, Jocelyn Polanco, Samantha N. MacMillan, Jeffery A. Bertke, Cina Foroutan-Nejad,\* Kyle M. Lancaster\* and Abolghasem 'Gus' Bakhoda\*

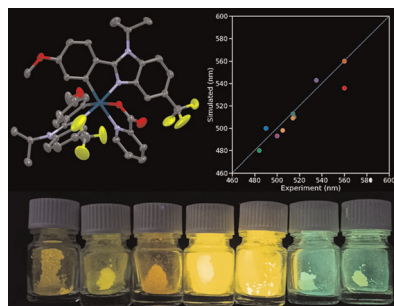
4698



### Zero-dimensional hybrid tin halides with stable broadband light emissions

Jing-Ning Lv, Jie Zhang, Yu-Meng Liu, Shao-Ya Zhang, Xiang-Yuan Deng, Man Xu, Xiao-Wu Lei, Zhi-Wei Chen\* and Cheng-Yang Yue\*

4705



### Neutral 2-phenylbenzimidazole-based iridium(III) complexes with picolinate ancillary ligand: tuning the emission properties by manipulating the substituent on the benzimidazole ring

Emiliano Martínez-Vollbert, Christian Philouze, Théo Cavignac, Camille Latouche,\* Frédérique Loiseau\* and Pierre-Henri Lanoë\*



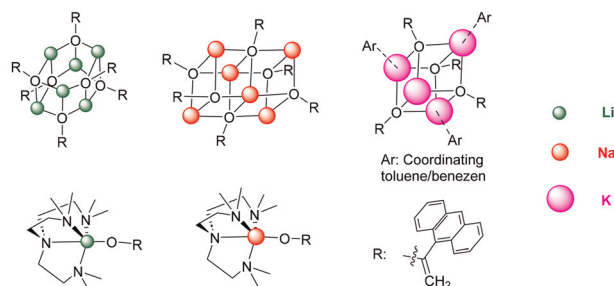


## PAPERS

4719

## Lithium, sodium and potassium enolate aggregates and monomers: syntheses and structures

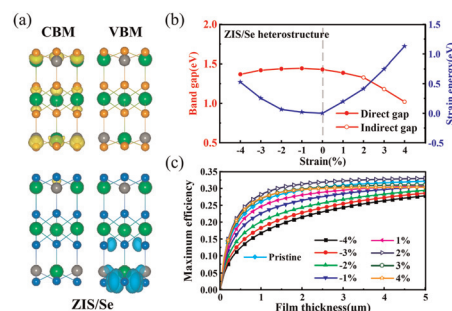
Nathan Davison, Jack M. Hemingway,\* Paul G. Waddell and Erli Lu\*



4729

Ultra-high photoelectric conversion efficiency and obvious carrier separation in photovoltaic  $\text{ZnIn}_2\text{X}_4$  (X = S, Se, and Te) van der Waals heterostructures

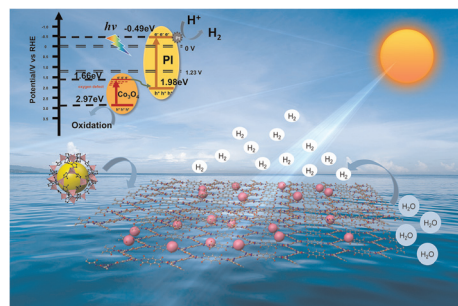
Zheng Liang, Yao-Zhong Liu, Ze-Ting Gong, Jun-Yao Li, Yong-Sheng Yao, Zhen-Kun Tang\* and Xiao-Lin Wei\*



4737

ZIF-derived oxygen vacancy-rich  $\text{Co}_3\text{O}_4$  for constructing an efficient Z-scheme heterojunction to boost photocatalytic water splitting

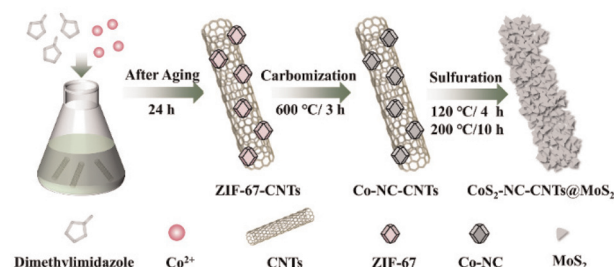
Susu Han, Zejin Wang, Wenbo Zhu, Huaizhi Yang, Le Yang, Ying Wang\* and Zhigang Zou



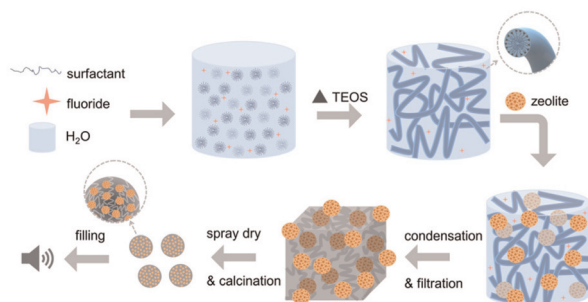
4753

## Exquisitely constructing hierarchical carbon nanoarchitectures decorated with sulfides for high-performance Li–S batteries

Siyu Deng, Yanwei Lv, Yang Zhao, Huiqing Lu, Zuqi Han, Lili Wu\* and Xitian Zhang\*



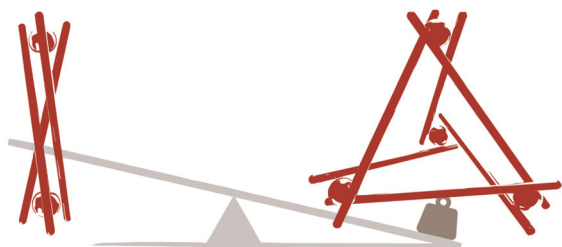
4764



### Synthesis of a zeolite@mesoporous silica composite to improve the low-frequency acoustic performance of a miniature loudspeaker system

Kongxin Liu, Yifei Zeng, Lu Han\* and Shunai Che\*

4772

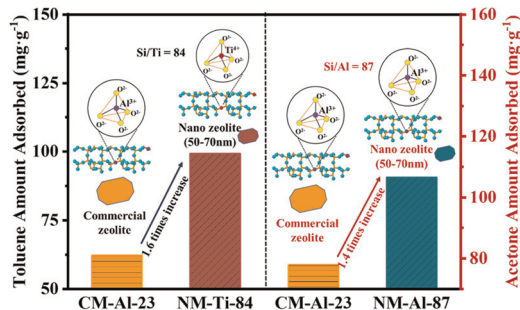


1 Increasing chelating angle 2 Stabilizing coordination geometry

### Subtle adjustments for constructing multi-nuclear luminescent lanthanide organic polyhedra with triazole-based chelates

Xiao-Qing Guo, Li-Peng Zhou, Shao-Jun Hu and Qing-Fu Sun\*

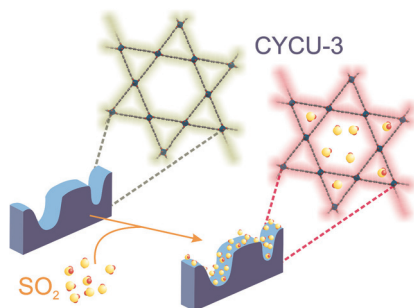
4781



### Preparation of nano-MFI zeolites doped with Al/Ti and their performance in VOC sorption

Xiaolong Wang, Donghang Chen, Yongsheng Jia, Zhongyu Jiang, Kongzhai Li, Soamwadee Chaianansutcharit, Prasert Reubroycharoen and Limin Guo\*

4790



### CYCU-3: an Al(III)-based MOF for SO<sub>2</sub> capture and detection

Juan L. Obeso, Valeria B. López-Cervantes, Catalina V. Flores, Ana Martínez, Yoarhy A. Amador-Sánchez, N. S. Portillo-Velez, Hugo A. Lara-García, Carolina Leyva, Diego Solís-Ibarra\* and Ricardo A. Peralta\*

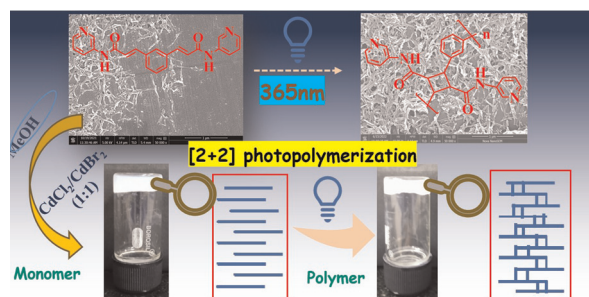


## PAPERS

4797

**Photo-responsive metal–organic gels of rigid phenylene-1,3-di-substituted angular dienes with metal halides: gel-to-gel transformations triggered by [2 + 2] polymerization**

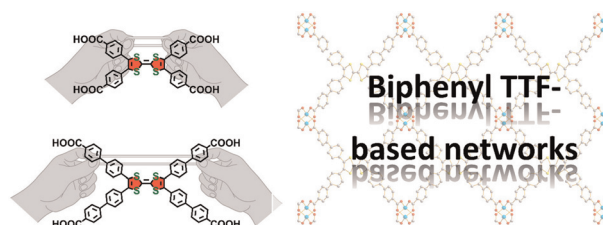
Shaheen Sultana, Rajorshi Mandal and Kumar Biradha\*



4805

**A redox active rod coordination polymer from tetrakis(4-carboxylic acid biphenyl) tetrathiafulvalene**

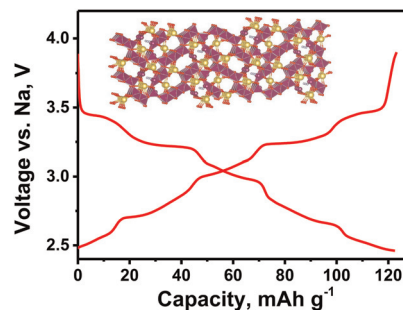
Nicolas Zigon,\* Federica Solano, Pascale Auban-Senzier, Stéphane Grolleau, Thomas Devic, Pavel N. Zolotarev, Davide M. Proserpio, Bolesław Barszcz, Iwona Olejniczak and Narcis Avarvari\*



4814

**New insights into tunnel-type  $\text{Na}_x\text{MnO}_{2-y}\text{F}_y$  with high performance and excellent cycling stability: the impact of F-doping**

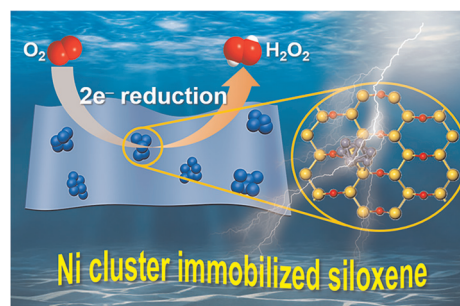
Rafaela Ruiz, Carlos Pérez-Vicente and Ricardo Alcántara\*



4823

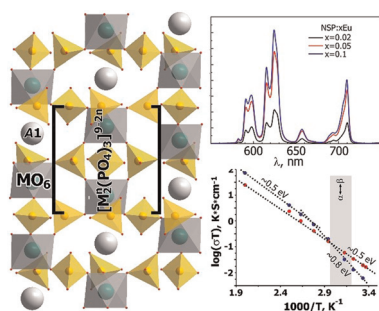
**Ni clusters immobilized on oxygen-rich siloxene nanosheets for efficient electrocatalytic oxygen reduction toward  $\text{H}_2\text{O}_2$  synthesis**

Haihui Hu, Ke Ma, Yuandong Yang, Na Jin, Linjie Zhang, \* Jinjie Qian and Lili Han\*





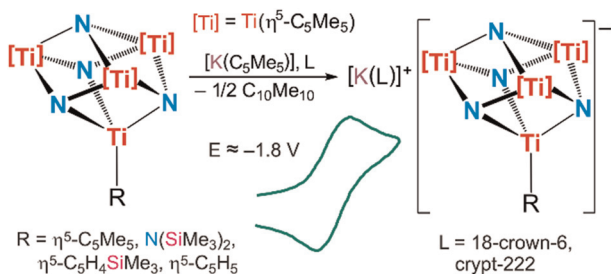
4833



### Influence of Sc substitution on the structure and properties of NASICON-type $\text{Na}_3\text{Sc}_{2-x}\text{R}_x(\text{PO}_4)_3$ ( $\text{R} = \text{Eu}, \text{Tb}, \text{Dy}$ ) phosphors

Nataliya Krutyak,\* Dmitry A. Spassky, Irina Kudryavtseva, Eldar M. Gallyamov, Daria G. Filatova, Aleksandr V. Mosunov and Vladimir A. Morozov

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### Studies on the chemical reduction of polynuclear titanium(IV) nitrido complexes

Jorge Caballo, Adrián Calvo-Molina, Sergio Claramonte, Maider Greño, Adrián Pérez-Redondo and Carlos Yélamos\*

