

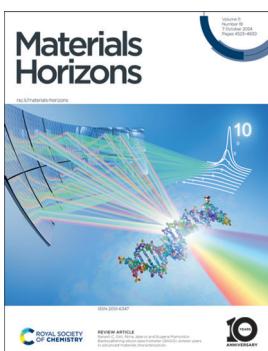
# Materials Horizons

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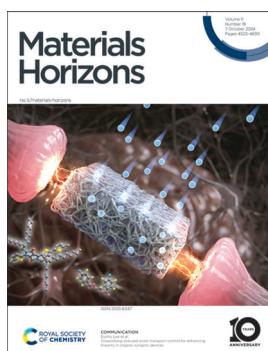
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ISSN 2051-6347 CODEN MHAOAL 11(19) 4523–4830 (2024)



### Cover

See Naresh C. Osti,  
Niina Jalarvo,  
Eugene Mamontov,  
pp. 4535–4572.  
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### Inside cover

See Eunho Lee et al.,  
pp. 4638–4650.  
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## EDITORIAL

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**Materials Horizons Emerging Investigator Series:**  
**Dr Mateusz Odziomek, Max Planck Institute of**  
**Colloids and Interfaces, Germany**

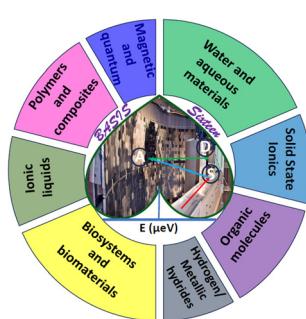


## REVIEWS

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**Backscattering silicon spectrometer (BASIS): sixteen years in advanced materials characterization**

Naresh C. Osti,\* Niina Jalarvo\* and Eugene Mamontov\*



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Elemental answers

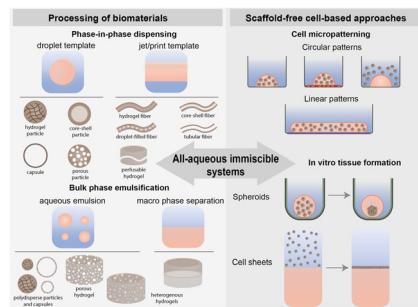
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## REVIEWS

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## Exploring the potential of all-aqueous immiscible systems for preparing complex biomaterials and cellular constructs

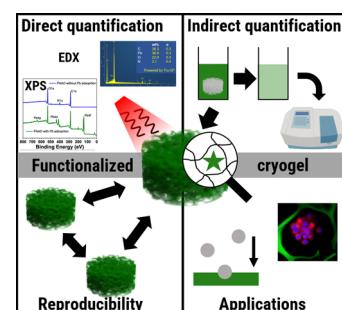
Raquel C. Gonçalves, Mariana B. Oliveira\* and João F. Mano\*



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## Surface functionalized cryogels – characterization methods, recent progress in preparation and application

Florian Behrendt,\* Michael Gottschaldt and Ulrich S. Schubert

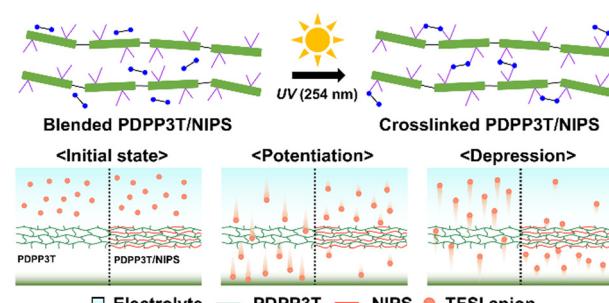


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## Crosslinking-induced anion transport control for enhancing linearity in organic synaptic devices

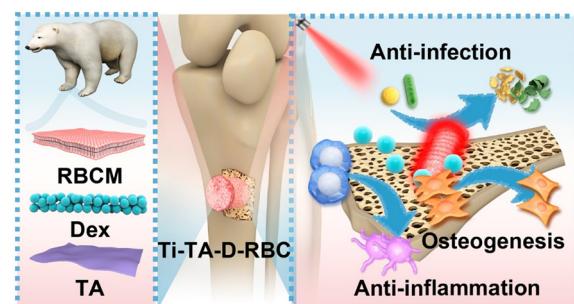
Hyoik Jang, Geun Yeol Bae, Seung Hyun Kim, Junho Sung and Eunho Lee\*



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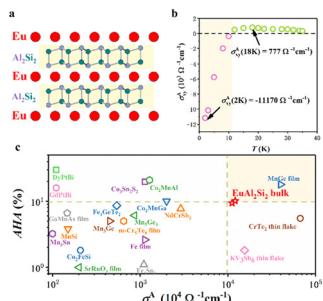
## Thermal control of photothermal implants inspired by polar bear skin for the treatment of infected bone defects

Mingyue Han, Xinlong Li, Shijie Shi, Ailin Hou, Han Yin, Lizhong Sun, Jianshu Li, Jun Luo, Jiyao Li\* and Jiaojiao Yang\*



## COMMUNICATIONS

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**Colossal anomalous Hall effect in the layered antiferromagnetic  $\text{EuAl}_2\text{Si}_2$  compound**

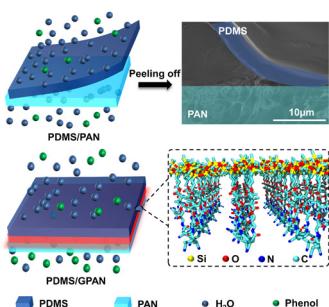
Jie Chen, Xiuxian Yang, Feng Zhou, Yong-Chang Lau, Wanxiang Feng, Yugui Yao, Yue Li, Yong Jiang and Wenhong Wang\*

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**Spirobifluorene-fused strategy enables pure-green multiple resonance emitters with low efficiency roll-off**

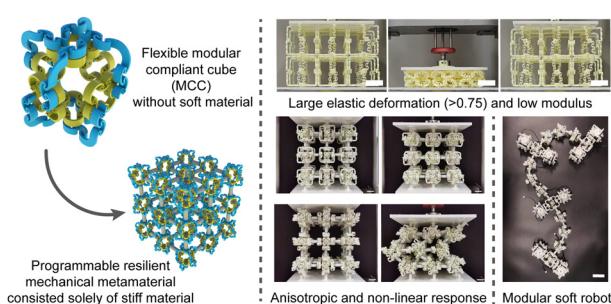
Hu Cheng, Jingbo Lan,\* Yudong Yang and Zhengyang Bin\*

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**Design of PDMS/PAN composite membranes with ultra-interfacial stability via layer integration**

Chao Sang, Siyuan Zhang, Zhihao Si,\* Qin Xu Li, Han Zhu Wu, Lankun Wang, Shilong Dong, Jan Baeyens, Peng-Fei Cao\* and Peiyong Qin\*

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**Programmable and resilient metamaterials with anisotropic and non-linear mechanical responses composed exclusively of stiff constituents**

Hongyi Yao, Xiaoyu Zhao, Kaiwen Shi, Wei Sun and Shengli Mi\*

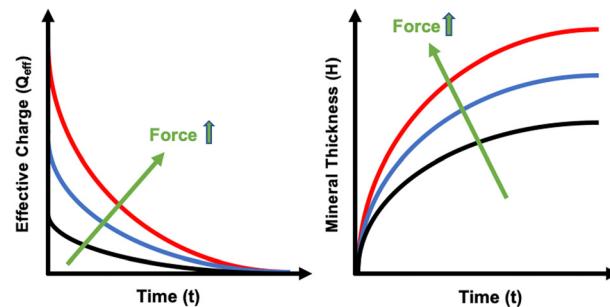


## COMMUNICATIONS

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**Self-limiting material growth triggered and tunable by force through piezochARGE-induced mineralization**

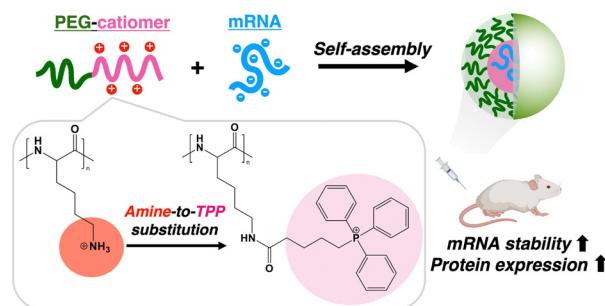
Grant Kitchen, Bohan Sun, Mostafa M. Omar, Adebayo Eisape and Sung Hoon Kang\*



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**Triphenylphosphonium-modified cationomers enhance *in vivo* mRNA delivery through stabilized polyion complexation**

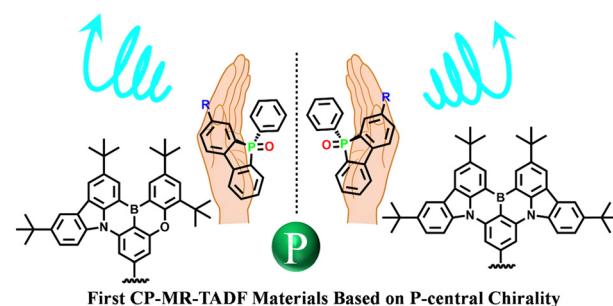
Jumpei Norimatsu, Hayato L. Mizuno, Takayoshi Watanabe, Takumi Obara, Makoto Nakakido, Kouhei Tsumoto, Horacio Cabral,\* Daisuke Kuroda\* and Yasutaka Anraku\*



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**Multiple-resonance thermally activated delayed fluorescence materials based on phosphorus central chirality for efficient circularly polarized electroluminescence**

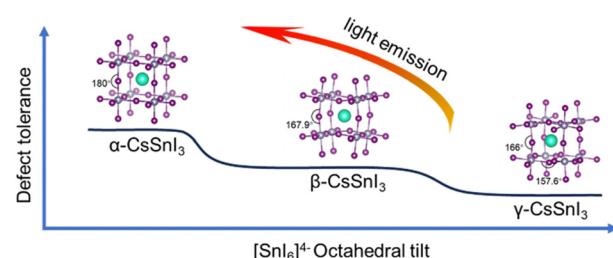
Yu Wang, Zi-Yi Lv, Zi-Xuan Chen, Shuai Xing, Zhong-Zhong Huo, Xian-Fang Hong, Li Yuan, Wei Li and You-Xuan Zheng\*



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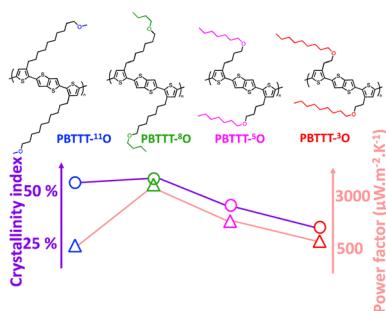
**High defect tolerance  $\beta\text{-CsSnI}_3$  perovskite light-emitting diodes**

Haixuan Yu, Tao Zhang, Zhiguo Zhang, Zhirong Liu, Qiang Sun, Junyi Huang, Letian Dai, Yan Shen, Xiongjie Li\* and Mingkui Wang\*



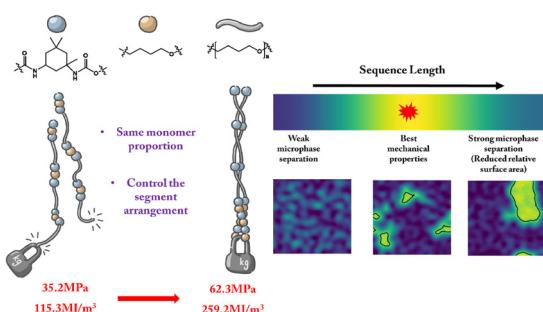
## COMMUNICATIONS

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**Controlling conjugated polymer morphology by precise oxygen position in single-ether side chains**

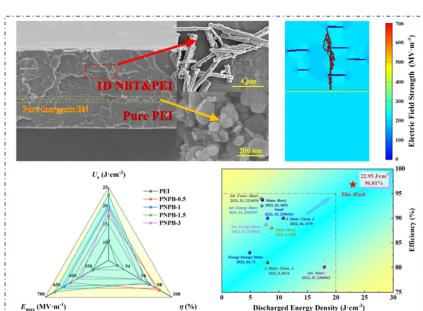
Pablo Durand, Huiyan Zeng, Badr Jismy, Olivier Boyron, Benoît Heinrich, Laurent Herrmann, Olivier Bardagot,\* Ioannis Moutsios, Alina V. Mariasevskaia, Alexey P. Melnikov, Dimitri A. Ivanov, Martin Brinkmann\* and Nicolas Leclerc\*

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**Filler effects inspired high performance polyurethane elastomer design: segment arrangement control**

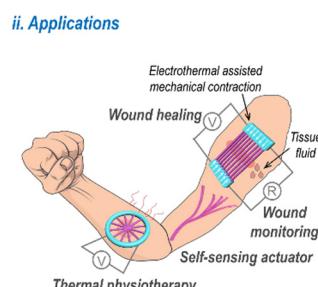
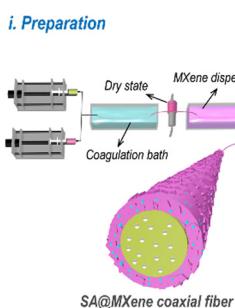
Jiaxin Shi, Tianze Zheng, Zhiqi Wang, Pujin Wang, Hongkun Yang, Jinjing Guo, Dong Wang, Baohua Guo and Jun Xu\*

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**Synergistically enhanced discharged energy density and efficiency achieved in designed polyetherimide-based composites via asymmetrical interlayer structure induced optimized interface effectiveness**

Yongjing Zhang, Ying Lin,\* Yanlong Ma, Qibin Yuan\* and Haibo Yang\*

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**Sodium alginate-based coaxial fibers synergistically integrate moisture actuation, length tracing, humidity sensing, and electric heating**

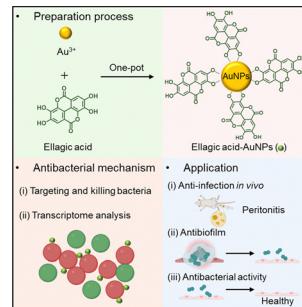
Lizhong Dong, Ming Ren, Yulian Wang, Xiaojie Yuan, Xiaobo Wang, Guang Yang, Yuxin Li, Wei Li, Yunfeng Shao, Guanlong Qiao, Weiwei Li, Hongli Sun, Jiangtao Di\* and Qingwen Li

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**Ellagic acid-modified gold nanoparticles to combat multi-drug resistant bacterial infections *in vitro* and *in vivo***

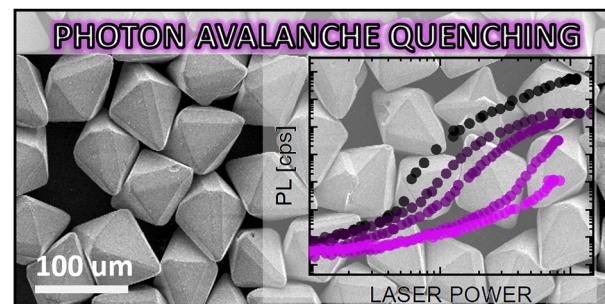
Yaran Wang, Fan Wu, Yuanfeng Li,\* Siran Wang, Yijin Ren, Linqi Shi,\* Henny C. van der Mei\* and Yong Liu\*



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**The mechanisms behind the extreme susceptibility of photon avalanche emission to quenching**

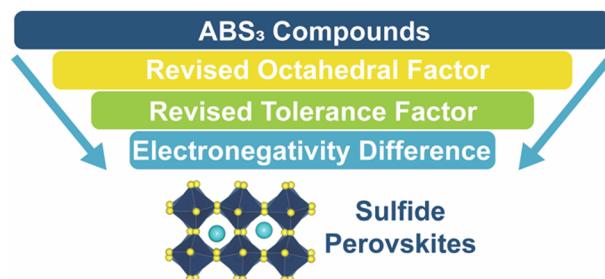
Martyna Majak,\* Małgorzata Misiak and Artur Bednarkiewicz\*



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**Rethinking tolerance factor analysis for chalcogenide perovskites**

Jonathan W. Turnley, Shubhanshu Agarwal and Rakesh Agrawal\*

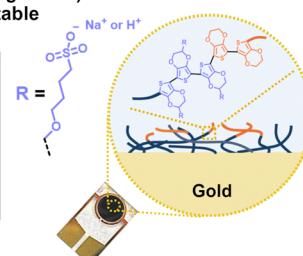
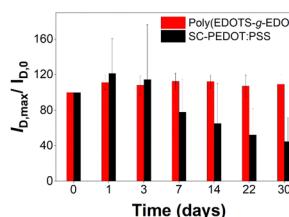


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**A PEDOT based graft copolymer with enhanced electronic stability**

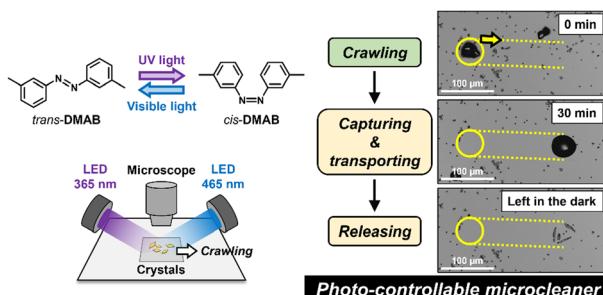
Modi Gu, Lorenzo Travaglini, Daniel Ta, Jonathan Hopkins, Antonio Lauto, Pawel Wagner, Klaudia Wagner, David L. Officer and Damia Mawad\*

**Electropolymerized poly(EDOTS-g-EDOT): structurally and electronically stable**



## COMMUNICATIONS

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### Photo-controllable microcleaner: photo-induced crawling motion and particle transport of azobenzene crystals on a liquid-like surface

Makoto Saikawa, Mio Ohnuma, Kengo Manabe, Koichiro Saito, Yoshihiro Kikkawa and Yasuo Norikane\*

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Maxim De Belder, Alysson F. Morais, Natan De Vos, Sergey Basov, Rikkie Joris, Margriet J. Van Bael, Luc Van Meervelt, Joeri F. M. Denayer, Johan A. Martens and Eric Breynaert\*

