

Materials Advances

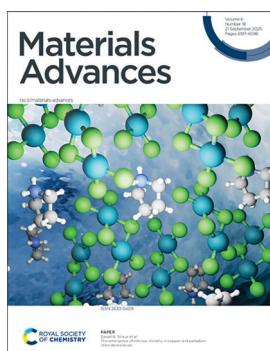
An open access journal publishing across the breadth of materials science

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(18) 6197–6598 (2025)



Cover

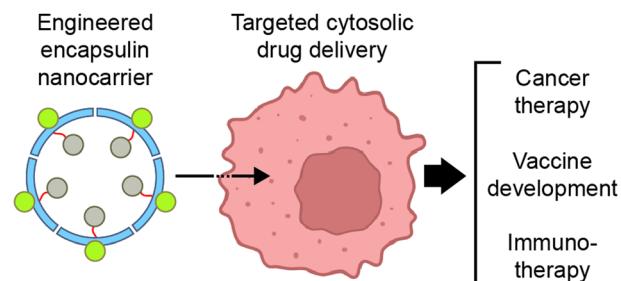
See Daniel B. Straus
et al., pp. 6262–6268.
Image reproduced
by permission of
Zheng Zhang and
Daniel B. Straus
from Mater. Adv.,
2025, 6, 6262.

REVIEWS

6209

Engineering encapsulin nanocages for drug delivery

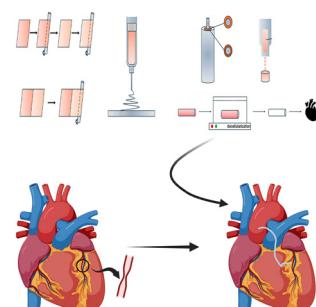
Seokmu Kwon and Tobias W. Giessen*



6221

An overview of small diameter vascular grafts: from materials to fabrication

Qian Li, Xili Ding, Cong Chen, Kui Zhang* and
Ran Dong*



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

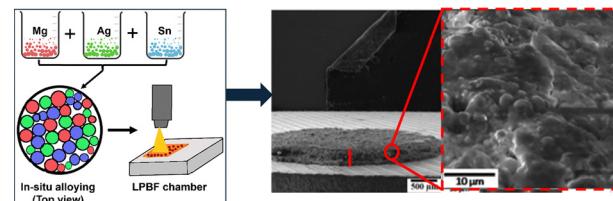
Registered charity number: 207890

COMMUNICATIONS

6243

Additive manufacturing of commercially pure magnesium and Mg–2Ag–2Sn alloys by *in situ* alloying during laser powder bed fusion

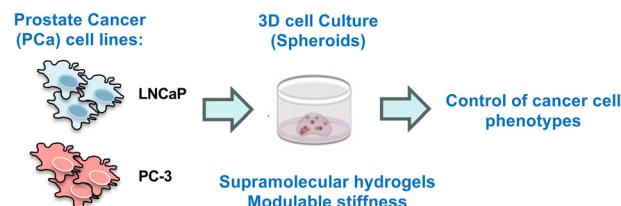
Ajit Kumar, Muralidhar Yadav, C. P. Paul, Sanjay Mishra, Satyam Suwas and Kaushik Chatterjee*



6257

Control of cancer cell phenotypes via supramolecular hydrogels: the role of extracellular matrix stiffness

Virginie Baylot, Bruno Alies, Palma Rocchi and Philippe Barthélémy*

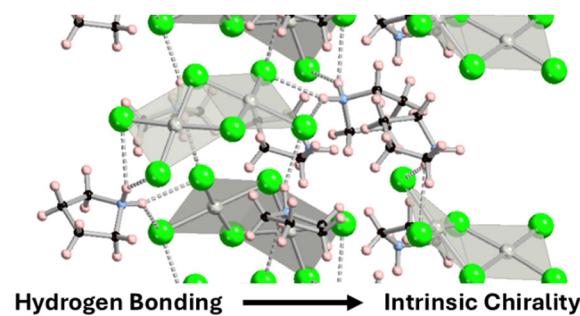


PAPERS

6262

The emergence of intrinsic chirality in copper and palladium chloride materials

Zheng Zhang, Santu Biswas, Matthew M. Montemore and Daniel B. Straus*



6269

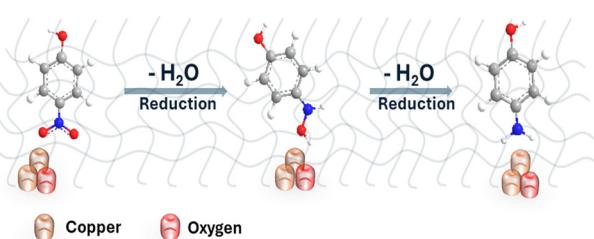
Natural dielectrics for organic field effect transistors: a study on resins derived from larch, spruce and Atlas cedar Pinaceae trees

Corina Schimanofsky, Andreas Petritz, Boyuan Ban, Cristian Vlad Irimia, Rosarita D'Orsi, Cigdem Yumusak, Felix Mayr, Yasin Kanbur, Sunwoo Kim, Alessandra Operamolla, Klara Saller, Manuela Schiek, Yolanda Salinas, Oliver Brüggemann, Christian Teichert, Chunlin Xu, Bong Sup Shim, Clemens Schwarzinger, Barbara Stadlober, Niyazi Serdar Sariciftci and Mihai Irimia-Vladu*



PAPERS

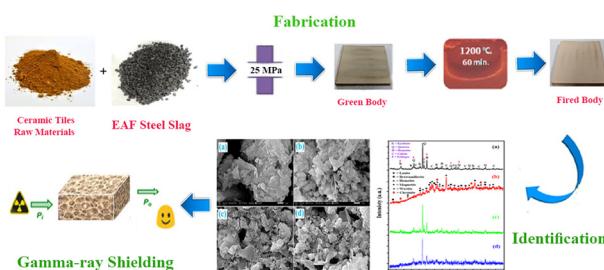
6291



Revealing an efficient copper oxide nanoparticle catalyst for the reduction of the hazardous nitrophenol: experimental and DFT studies

Elsayed Elbayoumy,* Emadeldin M. Ibrahim, Ashraf El-Binary, Tamaki Nakano and Mohamed M. Aboelnga

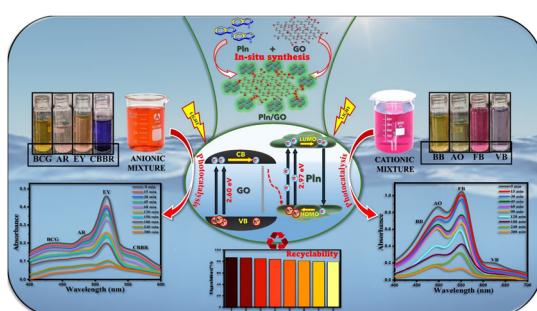
6305



Doping of steel slag waste as a sustainable filler in ceramic tile composites for enhanced gamma-ray shielding

Rehab M. El-Sharkawy,* Meshari Almeshari, Yasser Alzamil, Ahmad Abanomy, Bader Alshoumr, Asmaa M. Halbas, Elhassan A. Allam, Mohamed E. Mahmoud, H. A. Saudi and Atef El-Taher

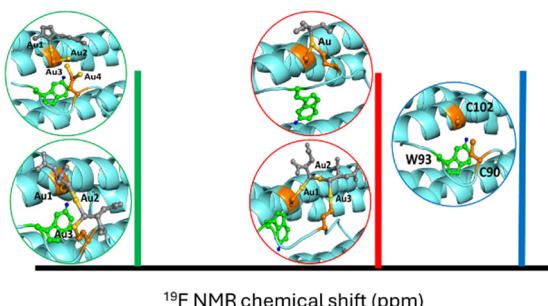
6320



Graphene oxide/polyindole nanocomposite: a highly efficient multi-cyclic, stable and sustainable photocatalyst platform for wastewater remediation under visible light

Arisha Bi, Sarfaraz Mahmood, Nitika Garg, Sahil Thakur, Saif Ali Chaudhry, Sarita Yadav, Madhulika Gupta, Mikhael Bechelany, Jai Prakash* and Zeba Haque*

6337



¹⁹F NMR as a tool to probe drug binding and structural dynamics in ferritin-based nanocarriers

Veronica Ghini, Giorgio Di Paco, Lucrezia Cosottini, Antonio Rosato and Paola Turano*

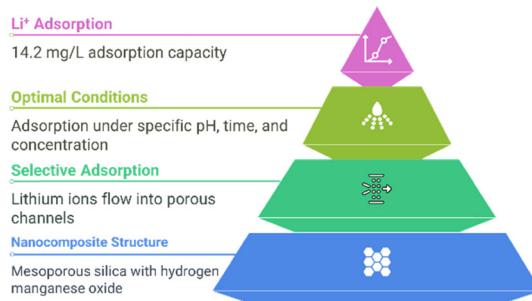


PAPERS

6345

Lithium recovery using a spinel-type hydrogen manganese oxide (HMO)–SBA-15 nanocomposite

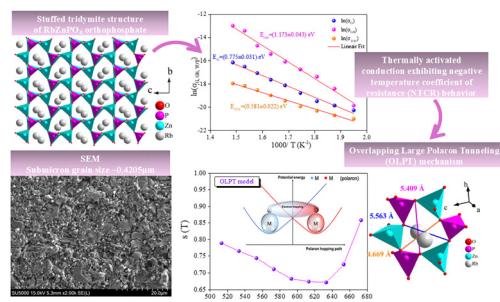
Keivan Sohrabpour,* Antonio Grisolia, Francesco Chidichimo, Pietro Argurio, Efrem Curcio, Salvatore Straface and Luigi Pasqua



6358

Comprehensive study of the structural, microstructural, and electrical properties of RbZnPO₄: insights into conduction mechanisms and the OLPT models

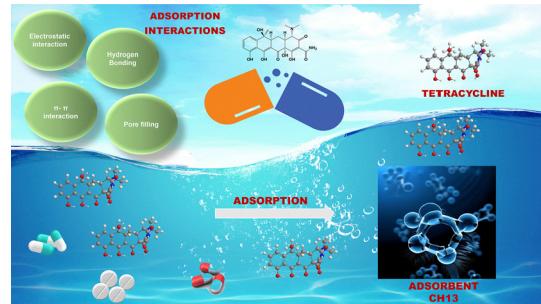
Imen Gharbi, Arafet Ghoudi, Najoua Weslati, Mohamed Tliha and Abderrazek Oueslati*



6370

CuBTC–clay composites with tunable ratios for antibiotic removal: unraveling isotherm, kinetic, and thermodynamic study

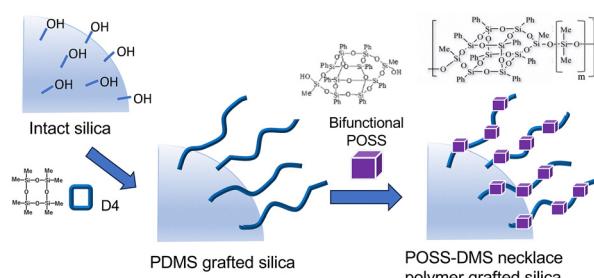
Palkaran Sethi, Sanghamitra Barman* and Soumen Basu*



6386

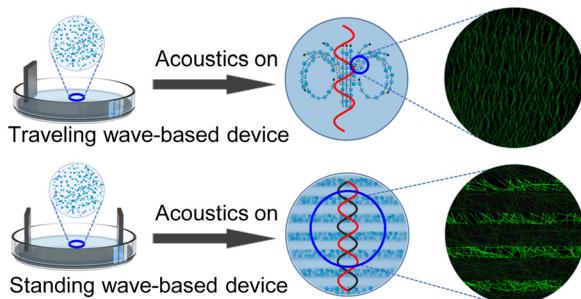
Silica-based hybrid materials formed by surface grafting with necklace polymers containing POSS–DMS structures

Shota Hikake, Hisao Oikawa and Masashi Kunitake*



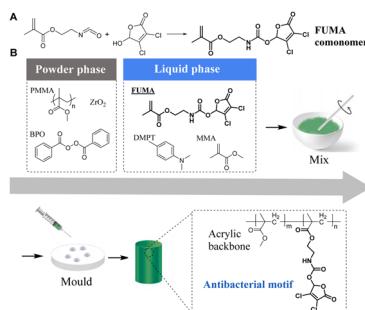
PAPERS

6394

**In-Petri-dish traveling and standing acoustic wave-assisted fabrication of anisotropic collagen hydrogels**

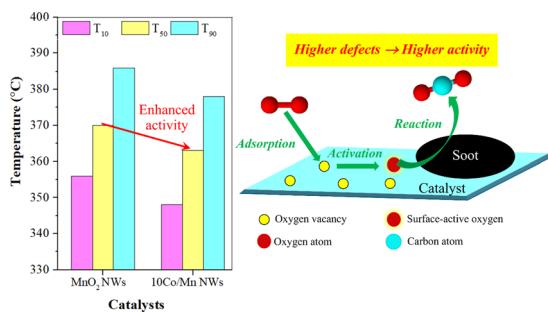
Yingshan Du, Jiali Li, Chongpeng Qiu, Liang Shen, Teng Li, Bowen Cai, Luyu Bo and Zhenhua Tian*

6406

**Furanone-based comonomer used to manufacture antibacterial bone cement with simultaneously enhanced mechanical strength and antibacterial activity**

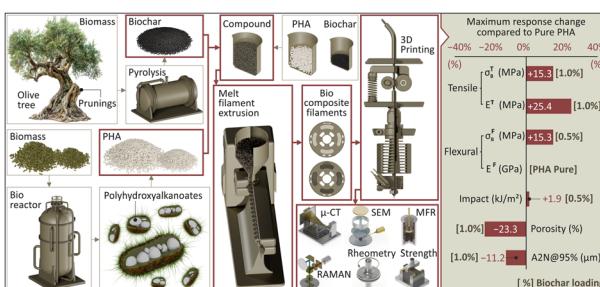
Xin Wang, Wen-Han Bu, Lu-Yang Han, Long-Xu Han, Qi-Ling Liang, Shan He, Zhe Gao, Yang Xu,* Jian-Jun Chu* and Fang He*

6416

**Enhanced catalytic performance of MnO₂ nanowires for soot combustion by cobalt incorporation**

Issara Sereewatthanawut, Chalempol Khajonvittayakul, Notsawan Swadchaipong, Vut Tongnan, Panupun Maneesard, Rossarin Ampairojanawong, Ammarika Makdee, Tawiwan Kangsadan, Matthew Hartley and Unalome Wetwatana Hartley*

6427

**Biodegradable polyhydroxyalkanoate (PHA) composites with biochar ratios optimized for the additive manufacturing method of material extrusion: engineering, rheological, and morphological insights**

Nectarios Vidakis, Nikolaos Michailidis, Dimitrios Kalderis, Apostolos Argyros, Katerina Gkagkanatsiou, Maria Spyridaki, Ioannis Valsamos, Vassilis Papadakis and Markos Petousis*

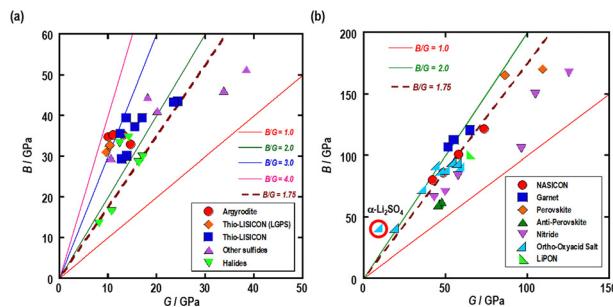


PAPERS

6445

First-principles evaluation of the elastic properties of crystalline Li-ion conductors

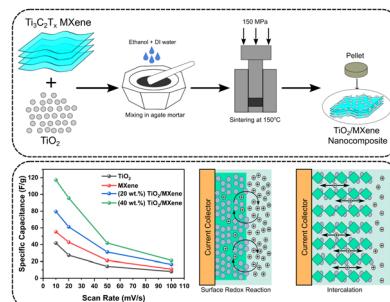
Masato Torii, Atsushi Sakuda,* Kota Motohashi and Akitoshi Hayashi



6454

Cold sintered $\text{TiO}_2\text{-Ti}_3\text{C}_2\text{T}_x$ MXene nanocomposites for supercapacitor electrode materials

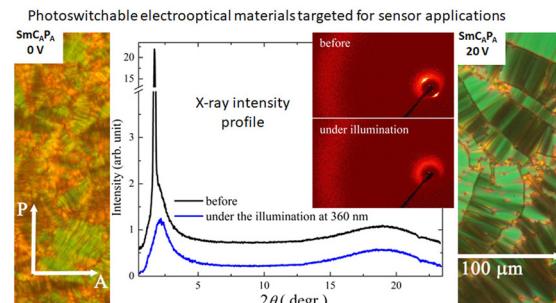
Abdul Hamid Rumman, Saimon Mahmud, Nishat Tasnim Mim, Janifa Akter, Ananya Roy, Ahsur Rahman Nirjhar, Md. Nazmul Ahsan Dipon, Md. Shofiqul Islam, Md Abdul Gafur, Aninda Nafis Ahmed* and Kazi Md. Shorowordi*



6469

Design and synthesis of photoresponsive bent-core liquid crystals exhibiting polar smectic phases

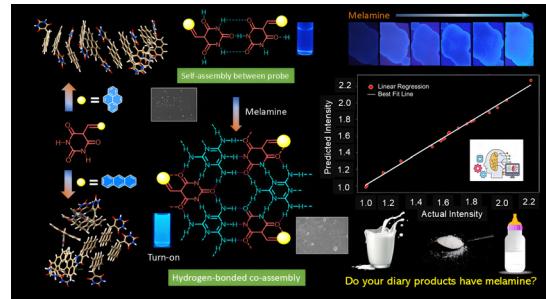
Barbora Jansová, Václav Kozmík, Jiří Svoboda, Martin Krupička, Damian Pociecha, Petr Bečvář, Marcel Bouvet,* Zuzana Böhmová, Vladimíra Novotná and Michal Kohout*



6479

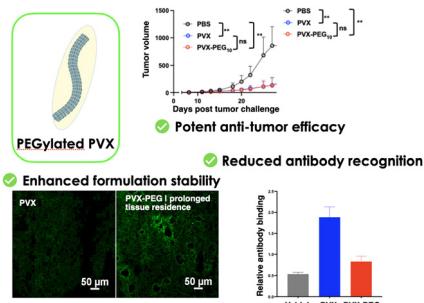
Planar vs. twisted pyrimidine derivatives: insights from molecular dynamics and predictive modelling for melamine detection in dairy products

Harshal V Barkale, Bappa Maiti and Nilanjan Dey*



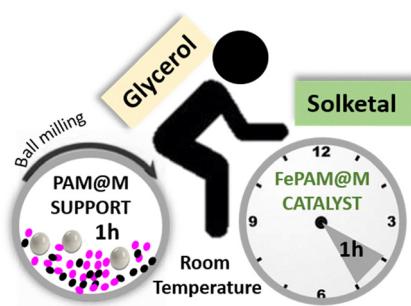
PAPERS

6493

**Efficacy of PVX and PEGylated PVX as intratumoral immunotherapy**

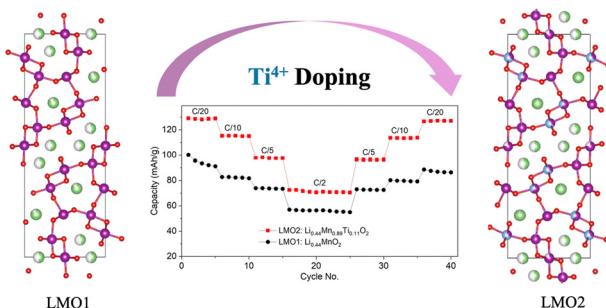
Yifeng Ma, Mary G. Gorman, Juliane Schuphan and Nicole F. Steinmetz*

6500

**Mechanochemical synthesis of poly(azomethine)s: a sustainable vehicle for metallic supports in valorisation of glycerol**

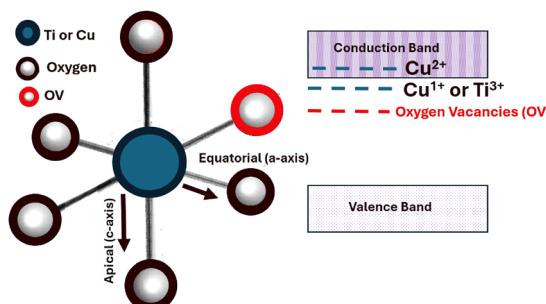
Jean A. Medina, Angela Matarín, Patricio A. Sobarzo, Claudio A. Terraza and Eva M. Maya*

6508

**The effect of Ti-doping on the electrochemical activity of the $\text{Li}_{0.44}\text{MnO}_2$ cathode material for Li-ion batteries**

Jaya Yadav, Sai Pranav Vanam, Shubham K. Parate, Nikhil Doddi, Velaga Srihari, Valérie Pralong, Maximilian Fichtner and Prabeer Barpanda*

6518

**Photoinduced supercapacitance and photocatalytic performance of TiO_2 enhanced by electronic band structure modification using Cu-doping**

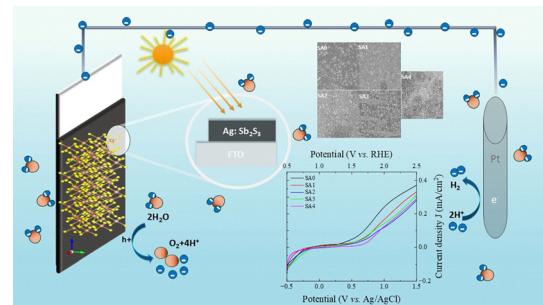
Sakshi Chaudhary, Kanak Pal Singh Parmar,* Prachi Jain and Ankush Vij

PAPERS

6528

Unveiling the role of silver-promoted phase evolution in antimony sulfide thin films for photoelectrochemical activity

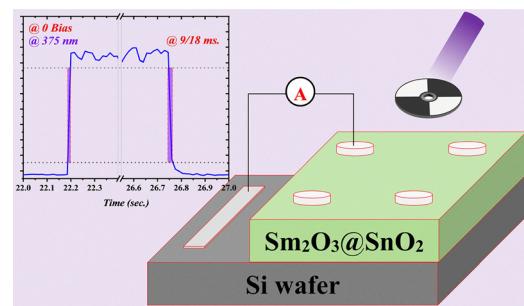
D. M. Kavya, Akshay Kumar Sonwane, Y. N. Sudhakar, Sajan D. George and Y. Raviprakash*



6542

Rare-earth Sm₂O₃-doped SnO₂: tailoring optoelectrical behaviors for a self-driven heterojunction UV-NIR photodetector

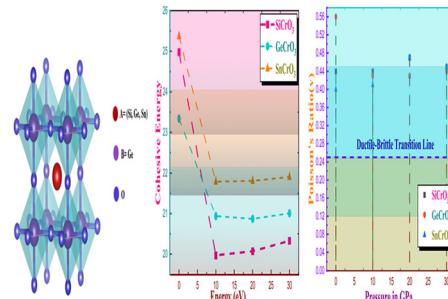
Jamal M. Rzaij, Noor F. Khdr Al Attwani, Ethar Yahya Salih* and Mustafa K. A. Mohammed



6550

Investigation of the half-metallicity signature and pressure-induced physical properties of cubic ACrO₃ (A = Si, Ge, Sn) multiferroic by DFT calculation

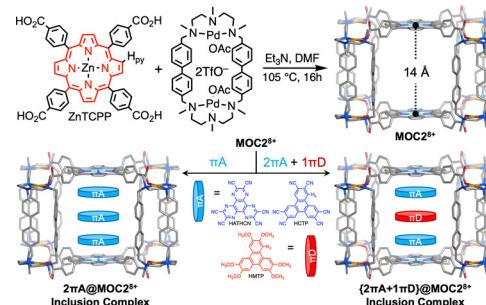
Md. Rony Hossain, Mst. Shamima Khanom, Prianka Mondal* and Farid Ahmed



6567

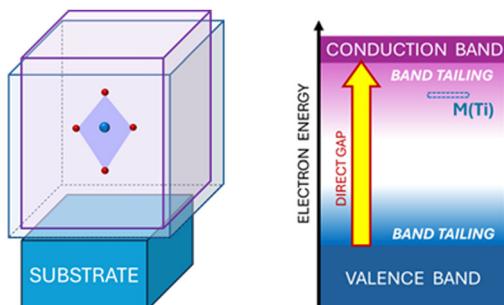
From an insulating Zn-porphyrin metallacage to electrically conducting inclusion complexes featuring extended π-donor/acceptor stacks

Evan Thibodeaux, Paola A. Benavides, Ellis Barger, Rakesh Sachdeva and Sourav Saha*



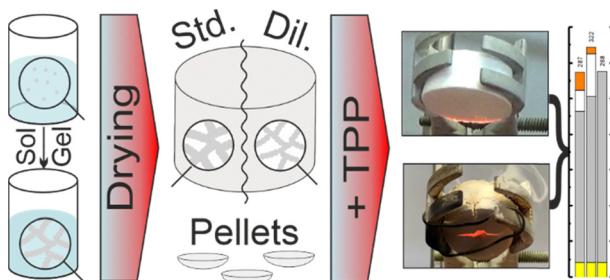
PAPERS

6575

**Substrate-induced strain control of (Mn, Fe, Co, Ni)-doping effects in SrTiO_3 thin films**

M. Tyunina,* N. Nepomniashchaia, O. Pacherova, T. Kocourek, V. Vetokhina and A. Dejneka

6585

**Flame-retardant impregnation of flexible hybrid-silica marshmallow aerogels for lightweight transportation**

Danny Bialuschewski,* Kai Steffens and Barbara Milow

