

ISSN 1001-0521 · e-ISSN 1867-7185  
CN 11-2112/TF · CODEN RARME 8

Volume 42 · Number 4 · April 2023

# RARE METALS

[www.springer.com/journal/12598](http://www.springer.com/journal/12598)

稀有金属(英文版)



Project for Enhancing International  
Impact of China STM Journals

万方数据



# RARE METALS (Monthly)

Volume 42 · Number 4 · April 2023

## REVIEWS

### Single-atom catalysts for electrochemical N<sub>2</sub> reduction to NH<sub>3</sub>

M.S. Iqbal · Z.-B. Yao · Y.-K. Ruan · R. Iftikhar · L.-D. Hao · A.W. Robertson · S.M. Imran · Z.-Y. Sun 1075

### Recent advances on bioreceptors and metal nanomaterials-based electrochemical impedance spectroscopy biosensors

Z.-B. Chen · H.-H. Jin · Z.-G. Yang · D.-P. He 1098

## MINI REVIEW

### Recovery of platinum from spent automotive catalyst based on hydrometallurgy

T. Ge · J.-D. He · L. Xu · Y.-H. Xiong · L. Wang · X.-W. Zhou · Y.-P. Tian · Z. Zhao 1118

## LETTERS

### Weakening CO poisoning over size- and support-dependent Pt<sub>n</sub>/X-graphene catalyst (X=C, B, N, n=1–6, 13)

A.-Q. Dong · H. Li · H.-M. Wu · K.-X. Li · Y.-K. Shao · Z.-G. Li · S.-H. Sun · W.-C. Wang · W.-B. Hu 1138

### Ultrasonic vibration-assisted multi-scale plastic forming of high-entropy alloys in milliseconds

W.-X. Wen · L.-Y. Li · Z. Li · W.-Q. Ruan · S. Ren · Z.-X. Zhang · X. Liang · H. Liu · J. Ma 1146

### Impurities analysis of high-purity osmium target for M-cathode application

J.-D. Ma · Y. Xia · Y.-F. Xie · C. Zhang 1154

## ORIGINAL ARTICLES

### Highly efficient cobalt-based amorphous catalyst for peroxymonosulfate activation toward wastewater remediation

X.-C. Zhou · S.-Q. Chen · M.-J. Zhou · M. Li · S. Lan · T. Feng 1160

### Synergistic etching and intercalation enables ultrathin Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub> and Nb<sub>2</sub>CT<sub>x</sub> MXene nanosheets

Q.-Q. Xiong · T. Muhmood · C.-X. Zhao · J.-S. Xu · X.-F. Yang 1175

### Ion exchange coupled biomineral self-sacrificial template synthesis of N-enriched porous carbon as robust electrocatalyst for rechargeable Zn-air battery

X. Xiao · H. Zhao · L.-F. Li · B.-L. Qu · Y.-L. Wu · Y.-L. Zhu · B.-B. Chen · G. Pan 1186

### N-doped C-coated MoO<sub>2</sub>/ZnIn<sub>2</sub>S<sub>4</sub> heterojunction for efficient photocatalytic hydrogen production

W. Dong · S.-A. Zhou · Y. Ma · D.-J. Chi · R. Chen · H.-M. Long · T.-J. Chun · S.-J. Liu · F.-P. Qian · K. Zhang 1195

### Synthesis of zinc-based metal–organic framework as highly efficient photocatalyst for decomposition of organic dyes in aqueous solution

G. Tan · Y.-Q. Guo · L.-Y. Zuo · K. Zhang · Y.-M. Zhang · L.-L. Zhang · J.-J. Yu · X. Feng · B. Li · L.-Y. Wang 1205

### Ultrafine SnO<sub>2</sub> in situ modified graphite felt derived from metal–organic framework as a superior electrode for vanadium redox flow battery

Q.-C. Jiang · J. Li · Y.-J. Yang · Y.-J. Ren · L. Dai · J.-Y. Gao · L. Wang · J.-Y. Ye · Z.-X. He 1214

### Electrochemically exfoliated WS<sub>2</sub> in molten salt for sodium-ion battery anode

B.-L. Zhang · X. Chen · H.-J. Zhao · H.-W. Xie · H.-Y. Yin 1227

### Mechanism of Li<sup>+</sup>/Na<sup>+</sup> separation by crown ether and butyrate acid root

Y.-P. Tian · C.-C. Wang · F. Zhang · S. Huang · L. Xu · Z. Zhao · B.-H. Tong 1238

### Bidirectionally aligned MXene hybrid aerogels assembled with MXene nanosheets and microgels for supercapacitors

P.-X. Li · G.-Z. Guan · X. Shi · L. Lu · Y.-C. Fan · J. Xu · Y.-Y. Shang · Y.-J. Zhang · J.-Q. Wei · F.-M. Guo 1249

### BaTiO<sub>3</sub>-based ceramics with high energy storage density

Y. Li · M.-Y. Tang · Z.-G. Zhang · Q. Li · J.-L. Li · Z. Xu · G. Liu · F. Li 1261

### Surfactant-enhanced electrochemical detection of bisphenol A based on Au on ZnO/reduced graphene oxide sensor

A.-Y. Zha · Q.-B. Zha · Z. Li · H.-M. Zhang · X.-F. Ma · W. Xie · M.-S. Zhu 1274

### Preparation of quasi-isotropic thermal conductive composites by interconnecting spherical alumina and 2D boron nitride flakes

H.-T. Niu · Y. Zhang · G. Xiao · X.-H. He · Y.-G. Yao 1283

**Lightweight, self-cleaning and refractory FeCo@MoS<sub>2</sub> PVA aerogels: from electromagnetic wave-assisted synthesis to flexible electromagnetic wave absorption**

S.-B. Qian · G. Liu · M. Yan · C. Wu 1294

**Decomposition of Nb<sub>3</sub>Si and mechanical-property improvement by adding appropriate amount of MgO in Nb–16Si–20Ti alloy**

D.-Z. Chen · Q. Wang · R.-R. Chen · S. Wang · Y.-Q. Su · H.-Z. Fu 1306

**Experimental investigation and thermodynamic assessment of La–Y–Ni ternary system in Ni-rich corner**

S.-X. Wu · L. Wang · H.-P. Yuan · Q. Luo · Q. Li · K.-C. Chou 1316

**Microstructure, mechanical properties and post-weld heat treatments of dissimilar laser-welded Ti<sub>2</sub>AlNb/Ti60 sheet**

Y. Wu · G. Liu · Z.-Q. Liu · Z.-J. Tang · B. Wang 1332

**Formation mechanism and mechanical properties of surface nanocrystallized Ti–6Al–4V alloy processed by surface mechanical attrition treatment**

Y.-F. Li · C. Chen · J. Ranabhat · Y.-F. Shen 1343

**Microstructure, cracking behavior and control of Al–Fe–V–Si alloy produced by selective laser melting**

S.-B. Sun · L.-J. Zheng · J.-H. Liu · H. Zhang 1353

**Thermal storage properties of Mg–LaNi using as a solar heat storage material**

Q. Wan · L.-J. Jiang · Z.-N. Li · Y. Yang · S.-M. Wang · X.-P. Liu 1363

**Microstructure and mechanical property of Mg–10Gd–2Y–1.5Zn–0.5Zr alloy processed by eight-pass equal-channel angular pressing**

H. Liu · J. Ju · X.-W. Yang · Y.-H. Li · J.-H. Jiang · A.-B. Ma 1371

**Preparation of W–TiC alloys from core–shell structure powders synthesized by an improved wet chemical method**

S.-T. Lang · Q.-Z. Yan · N.-B. Sun · X.-X. Zhang 1378

**Properties of Fe–Mn–Al alloys with different Mn contents using density functional theory**

X. Luo · J. Feng · Y.-H. Liu · M.-Y. Hu · X.-Y. Chong · Y.-H. Jiang 1387

**Crystal orientation in Ni–Mn–In melt-spun ribbons**

Y. Feng · C. Fang · Y.-L. Ai · H.-B. Wang · L. Gao · H. Chen · X.-H. Bian 1398

**Coercivity enhancement of hot-deformed Nd–Fe–B magnets with Pr–Cu alloy addition**

J.-M. Wang · Z.-H. Guo · Z. Jing · X. Du · N.-J. Yu · M.-Y. Li · M.-G. Zhu · W. Li 1403

**Cyclic oxidation behavior of electron beam physical vapor deposition NiAlHf and NiAlHfCrSi coatings at 1150 °C**

S.-J. Liang · H.-H. Song · L. Zheng · H.-B. Guo 1408

**Structural properties and crystal orientation of polycrystalline Gd films**

Y.-Z. Zhang · S.-R. Zhang · D.-B. Yu · Y. Luo · N.-T. Quan · W.-L. Yan · K.-S. Li 1414

**Anti-adsorption mechanism of ion-adsorption type rare earth tailings**

W.-F. Huang · H. Wu · X.-D. Li · J.-C. Ou · X.-L. Huang 1420

#### Cover Picture

X.-C. Zhou et al. Highly efficient cobalt-based amorphous catalyst for peroxymonosulfate activation toward wastewater remediation

Further articles can be found at [link.springer.com](http://link.springer.com)

Instructions for Authors for *Rare Met.* are available at [www.springer.com/12598](http://www.springer.com/12598)

## Cover story

### Highly efficient cobalt-based amorphous catalyst for peroxymonosulfate activation towards wastewater remediation

(Xue-Chun Zhou, Shuang-Qin Chen\*, Ming-Jie Zhou, Mai Li, Si Lan\*, Tao Feng\* pp. 1160–1174)

In recent decades, water pollution aroused by various contaminants has become a critical societal issue, due to its adverse effects on human beings and ecosystem. Metallic glasses (MGs) are rising novae in the catalytic field, due to their unique amorphous structure, such as large residual stress, and high density of low coordination sites. However, there is still an absence of suitable MGs' catalysts for advanced oxidation processes (AOPs) with peroxymonosulfate (PMS), the most efficient and promising wastewater remediation technology. Particularly, PMS was utilized for AOPs, which is suitable for a wider pH range, and generated  $\text{SO}_4^{\cdot-}$  possesses high oxidation potential and long half-life. Herein, Co-MG with nominal composition of  $\text{Co}_{67}\text{Fe}_4\text{Mo}_{1.5}\text{Si}_{16.5}\text{B}_{11}$  (at%) was utilized as catalyst of PMS for azo dye degradation. Azo dyes are the largest class of synthetic dyes used in the textile industry and have caused serious ecological and environmental problems due to their toxicity, non-biodegradability and potential carcinogenicity. The results demonstrated that the Co-MG/PMS system had an order of magnitude higher efficiency on OII degradation, compared with the Fe-MG/PMS system. For fundamental study and field application, the effect of adding inorganic anions ( $\text{Cl}^-$ ,  $\text{HCO}_3^-$ ,  $\text{H}_2\text{PO}_4^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ ), environmental factors, and cycle experiments on the degradation properties of Co-MG was investigated emphatically to evaluate overall catalytic performance. It has demonstrated that the Co-MG with better recyclability, more stability and better corrosion resistance contrasted to Fe-MGs. The present results provide not only a new candidate but also shed light on exploring a new kind of AOPs system based on cobalt MGs for wastewater treatment.

Edited and Published by Youke Publishing Co., Ltd.

(No. 2, Xijiekouwai Str., 100088 Beijing, China)

Tel.: +86 10 82241917; Fax: +86 10 82240869

Email: raremetals@grinm.com

Administrator: China Association for Science and Technology

Sponsor: The Nonferrous Metals Society of China

China GRINM Group Co., Ltd.

Printer: Beijing Shengpinfengshang Technology Development Co., Ltd.,

Beijing, China

ISSN 1001-0521



Price: RMB 500