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MINI REVIEW

Computer simulation of super-magnetoelastic behavior near critical region of magnetic materials based on phase-field method

Z. Zhang · C.-C. Hu · A.-H. Zhou · Y.-X. Xu · Y.-Y. Wu · H.-H. Huang · H.-B. Huang · J.-J. Ni · W. Li · W.-F. Rao **2477**

REVIEWS

Chiral metal nanostructures: synthesis, properties and applications

S.U. Abbas · J.-J. Li · X. Liu · A. Siddique · Y.-X. Shi · M. Hou · K. Yang · F. Nosheen · X.-Y. Cui · G.-C. Zheng · Z.-C. Zhang **2489**

Recent advances of ferro-/piezoelectric polarization effect for dendrite-free metal anodes

H.-X. Zhang · P.-F. Wang · C.-G. Yao · S.-P. Chen · K.-D. Cai · F.-N. Shi **2516**

LETTER

High-efficiency dielectric capacitors based on BaTi_{0.5}Hf_{0.5}O₃ films

Y. Lin · F. Li · Z. Li **2545**

ORIGINAL ARTICLES

Enhanced breakdown strength of BaTiO₃-based multilayer ceramic capacitor by structural optimization

Q. Liu · H. Hao · Q.-H. Guo · Z.-H. Shen · J. Wang · M.-H. Cao · Z.-H. Yao · H.-X. Liu **2552**

Nb₂CT_x MXene boosting PEO polymer electrolyte for all-solid-state Li-S batteries: two birds with one stone strategy to enhance Li⁺ conductivity and polysulfide adsorptivity

S.-M. Liu · M.-X. Chen · Y. Xie · D.-H. Liu · J.-F. Zheng · X. Xiong · H. Jiang · L.-C. Wang · H. Luo · K. Han **2562**

Multifunctional sulfur-immobilizing GO/MXene aerogels for highly-stable and long-cycle-life lithium-sulfur batteries

W.-H. Yang · Z.-C. Ni · D. You · J.-Y. Hou · B.-N. Deng · R.-W. Huang · S.-G. Sun · J.-B. Zhao · X. Li · Y.-Y. Zhang · Y.-J. Zhang **2577**

Necklace-like carbon nanofibers encapsulating MoO₂ nanospheres with Mo-C bonding for stable lithium-ion storage

J. Chen · X.-L. Chen · R. Lu · Y. Li · A.-Q. Pan **2592**

Hierarchical Zn₃V₂O₈ microspheres interconnected via conductive carbon nanotubes as promising anode materials for lithium-ion battery applications

M.-M. Liu · H.-T. Yu · L. Yuan · T.-F. Yi · F. He · Y. Xie **2601**

Enhanced cycling stability of single-crystal LiNi_{0.83}Co_{0.07}Mn_{0.10}O₂ by Li-reactive coating with H₃BO₃

W.-H. Hu · Y. Yin · Y. Sun · G.-X. Liu · S.-Y. Yang · Y.-Y. Huang · B. Wang **2612**

Phosphorus/nitrogen co-doped hollow carbon fibers enabling high-rate potassium storage

Y. Zhou · S. Tian · M.-Y. Jia · P.-B. Gao · G.-C. Yin · X.-M. Wang · J.-L. Mu · J. Zhou · T. Zhou **2622**

Mechanically flexible V₃S₄@carbon composite fiber as a high-capacity and fast-charging anode for sodium-ion capacitors

Z.-F. Mao · X.-J. Shi · T.-Q. Zhang · P.-J. Liang · R. Wang · J. Jin · B.-B. He · Y.-S. Gong · Q. Wang · X.-L. Tong · H.-W. Wang **2633**

Template sacrificial controlled synthesis of hierarchical nanoporous carbon@NiCo₂S₄ microspheres for high-performance hybrid supercapacitors

K. Yuan · T.-J. Gao · Y. Yang · W. Luo · S. Li · C.-Y. Zhang · J.-X. Xu · N. Li · Y.-R. Zhu **2643**

1T-phase MoS₂ edge-anchored Pt₁-S₃ active site boosting selective hydrogenation of biomass-derived maleic anhydride

X. Sun · Y. Zhao · K. Chang · B. Peng · Q.-Q. Gu · B. Yang · B.-Y. Yu · J. Xu · F.-D. Liu · Y. Zhang · C.-S. Pan · Y. Lou **2658**

A N/Co co-doped three-dimensional porous carbon as cathode host for advanced lithium-selenium batteries

F. Gao · X.-A. Yue · X.-Y. Xu · P. Xu · F. Zhang · H.-S. Fan · Z.-L. Wang · Y.-T. Wu · X. Liu · Y. Zhang **2670**

Carbon honeycomb structure with high axial thermal transport and strong robustness

W.-J. Ren · S. Lu · C.-Q. Yu · J. He · J. Chen 2679

Enhanced leaching of metals from spent lithium-ion batteries by catalytic carbothermic reduction

Y.-C. Zhang · W.-H. Yu · S.-M. Xu 2688

Enrichment of Ni–Mo–V via pyrometallurgical reduction from spent hydrogenation catalysts and the multi-reaction mechanism

Z.-S. Shi · Y.-J. Ding · X.-P. Yin · B. Liu · H.-L. Shen · B.-Y. Wu · B.-H. Zhao · F.-L. Han · C. Ekberg · S.-G. Zhang 2700

Prediction of sintered density of binary W(Mo) alloys using machine learning

H.-X. Liu · Y.-F. Yang · Y.-F. Cai · C.-H. Wang · C. Lai · Y.-W. Hao · J.-S. Wang 2713

Separation and purification of Yb₂O₃ by ion exchange chromatography and preparation of ultra-high purity Yb₂O₃

X.-J. Pan · Z.-Q. Yang · Y. Xu · M. Wang · X.-W. Huang · Z.-Y. Feng · Q. Zhong · X.-L. Peng 2725

Phase equilibria in Co-Ti-Re ternary system

L.-L. Li · C.-P. Wang · S.-Y. Yang · J.-J. Han · Y. Lu · J.-B. Zhang · X.-J. Liu 2736

Dissolution characteristics of black aluminum dross in Na₃AlF₆-AlF₃-Al₂O₃ molten salt system

Z.-P. Zuo · G.-Q. Yu · C.-L. Liu · G.-C. Liu · F.-Q. Liu 2747

Phase transformation behavior of a dual-phase nanostructured Fe-Ni-B-Si-P-Nb metallic glass and its correlation with stress-impedance properties

J.-C. Ge · A.-H. Liu · Z.-D. Wu · Y. Gu · Y.-B. Ke · A.-D. Wang · Y. Ren · S. Tang · H.-Q. Ying · H. Zhu · X.-L. Wang · S. Lan 2757

High-temperature oxidation behaviour of minor Hf-doped β-NiAl single crystals in dry and humid atmospheres

K. Yan · J. He · H.-B. Guo 2767

Microstructural evolution and mechanical properties of Ni-45Ti-5Al-2Nb-1Mo alloy subjected to different heat treatments

X.-Y. Song · Y. Li · F. Zhang 2774

Variant selection of nanocrystalline α phase in metastable β TB8 titanium alloy via electric pulse treatment

S.-S. Wu · Y. Yang · Y.-B. Tan · S. Xiang · Y.-L. Zhou · M. Ma · F. Zhao · W. Shi 2781

Mechanism of fracture toughness property of aging-hardening eutectic Al–Si alloys

T. Hong · G. Zhao 2795

Microstructures and properties of Nb–Si-based alloys with B addition

L.-S. Luo · F.-X. Wang · X.-Y. Meng · Y.-J. Xu · L. Wang · Y.-Q. Su · J.-J. Guo · H.-Z. Fu 2801

Microstructure and mechanical properties of WC–Co-based cemented carbide with bimodal WC grain size distribution

R.-J. Cao · C.-G. Lin · X.-C. Xie · Z.-K. Lin 2809

Enhanced wettability of zinc passivation layer by coating organic–inorganic multilayers

X.-D. Shao · L.-Q. Zhu · W.-P. Li · H.-N. Chen · H.-C. Liu 2816

Cover Picture

S.-M. Liu et al. Nb₂CT_x MXene boosting PEO polymer electrolyte for all-solid-state Li-S batteries: two birds with one stone strategy to enhance Li⁺ conductivity and polysulfide adsorptivity.

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Cover story

Nb₂CT_x MXene boosting PEO polymer electrolyte for all-solid-state Li-S batteries: two birds with one stone strategy to enhance Li⁺ conductivity and polysulfide adsorptivity

(Si-Ming Liu, Meng-Xun Chen, Ying Xie, Deng-Hua Liu, Jin-Fei Zheng, Xiang Xiong, Heng Jiang, Li-Chang Wang*, Heng Luo*, Kai Han* pp. 2562–2576)

All-solid-state lithium-sulfur batteries have attracted significant attention due to their exceptional energy density and enhanced safety. However, the presence of polysulfides in PEO polymer electrolytes leads to the shuttle effect, along with the relatively low ionic conductivity of PEO electrolytes. To overcome these hurdles, we have successfully integrated Nb₂CT_x MXene into the PEO solid electrolyte and employed vacuum probe sonication to regulate its sheet size. The introduction of Nb–S bonding between Nb₂CT_x and polysulfides significantly improves the adsorption of polysulfides. Additionally, the reinforced interaction between the PEO matrix and the Nb₂CT_x MXene interface facilitates the efficient transport of Li⁺. In the cover figure, the rapid conduction of Li⁺ transport by Nb₂C, is represented by a high-speed train, while polysulfides are effectively adsorbed by Nb₂C, symbolized by a yellow car.

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