

Table of Contents

Preface

Chapter 1: Materials and Technologies for Energy Storage

***In Situ* Synthesis of VO₂ Embedded in Graphite/Si as a High Performance Anode for Lithium-Ion Batteries**

Y. Yan, W.J. Peng, R.J. Fan, G.L. Cao, H.J. Guo, X.H. Shen and Z.Y. Tian 3

Studies of Iron-Doped Carbon Material from Carbonization of Soy Protein/Polyaniline Composite and its Electrical Capacitance

Q.W. Zhang, T. Fang, H. Lu, W. Wang, Q.Q. Zhang and J. Wan 13

Ni-MnO₂ Synthesized by One-Step Liquid Phase Coprecipitation as Promising Electrode Materials for Supercapacitor

Y. Zhou, Q.H. Yang and J. Dong 21

Chapter 2: Materials and Technologies for Nuclear Reactors

Research about the Hydrogen Removal Verification Method through Porous Medium of Silver Zeolite in Nuclear Power Station

Q.B. Bao, J. Hu and S.F. Zhou 31

Effects of Neutron, Ion and Proton Irradiation on Nano-Indentation Hardness of RPV Steels

C.L. Li, G.G. Shu, J.L. Yan, W. Liu and Y.G. Duan 39

Study on High Speed Laser Welding Technology and Numerical Simulation of Driving Line Guide Structure of PWR

B.C. Guo, H.W. Gong, E. Jiang and X.L. Yue 47

Effect of Solution Treatment on Microstructure and Properties of SLM 316L Stainless Steel for Nuclear Power Field

L. Chen, J.L. Shang, Y.Z. Liu, J.G. Zhao and P. Zhu 56

Study on Application Performance of Instrument Valve Body Formed by Selective Laser Melting for Nuclear Power Plant

Y.L. Huang, Y.Z. Liu, J.G. Zhao, P. Zhu and L. Tan 64

The Development of Alumina Forming Austenitic Alloy for Core Application in Advanced Nuclear Reactors

Z.J. Zhou, L.Z. Chen, Y. Gao and Q. Wang 72

Chapter 3: Functional Materials

Dynamic Compression Performance of Reaction Sintering SiC/B₄C Composite

X.J. Gao, Hasigaowa, M.Y. Sun, C.D. Liao, W.P. Huang, P. Man, W. Zhang and Y.W. Zhou 83

Preparation of Functionalized Graphene Multilayer Composite Films Supported Pt Catalyst and its Electro-Oxidation for Methanol

M.H. Luo, Y. Ai and K.J. Xia 91

Deposition of SiO₂/SiC Coating on Carbon Fiber to Enhance the Oxidation Resistance

A.M. Bu, Y.F. Zhang, Y. Xiang, Y.J. Yang, W.W. Chen, H.W. Cheng and L. Wang 100

Chapter 4: Computational Materials Science

First-Principles Study on Electronic Structure, Elasticity, Debye Temperature and Anisotropy of Cubic KCaF₃

X. Liu, J. Fu, M.M. Han, K.X. Sun and S.L. Wei 109

RUL Prediction of Lithium Ion Battery Based on ARIMA Time Series Algorithm

C. Lu, Z.J. Gu and Y. Yan 117

Computer Simulation of Horizontal VPE Grown AlN J.Q. Liu, X.J. Xie and Q.H. Yang	129
Electronic Properties of Thermoelectric PbSe₂ Compound by Density Functional Theory Method M.M. Han, J. Fu, X. Liu and T. Jiang	136

Chapter 5: Materials for Biomedical Application

Preparation and Properties of Nano Coir Cellulose Whiskers Enhanced CS/PVA Composite Film G.J. Li, H.X. Luo, W. Xia, X.F. Xu and Y. Zhang	145
Investigation on the Synergistic Effect of Surfactants for Silylation of Montmorillonite Y.H. Ran, S.Y. Sun, K.X. Shen, D.Y. Tan, Y.H. Liu, L. Li and Y.Q. Ren	155

Chapter 6: Coal Pyrolysis Technologies

Effects of Direct Coal Liquefaction Residue Additions on Low-Rank Pulverized Coal during Co-Pyrolysis N. Yin, Y.H. Song, J. Zhou, Y.H. Tian and A.W. Yang	167
Metal Sulfide Assisted Coal Catalytic Hydrogenated Microwave Pyrolysis C.B. Liu and C.S. Yue	178