

# 物 理 学 报

第 70 卷 第 12 期 2021 年 6 月 20 日

## 目 次

### 专题: 二维磁性材料

120101 二维磁性材料专题编者按 ..... 聂天晓 邵启明

#### 综述

127301 大面积二维磁性材料的制备及居里温度调控 ..... 王海宇 刘英杰 寻璐璐 李竞 杨晴 田祺云 聂天晓 赵巍胜

127302 层状磁性拓扑材料中的物理问题与实验进展 ..... 孙慧敏 何庆林

127303 二维材料中贝里曲率诱导的磁性响应 ..... 刘雨亭 贺文字 刘军伟 邵启明

127501 基于二维材料的自旋-轨道矩研究进展 ..... 何聪丽 许洪军 汤建 王潇 魏晋武 申世鹏 陈庆强 邵启明 于国强 张广宇 王守国

127503 二维磁性材料及多场调控研究进展 ..... 肖寒 弭孟娟 王以林

127504 二维  $\text{CrI}_3$  晶体的磁性测量与调控 ..... 张颂歌 陈雨彤 王宁 柴扬 龙根 张广宇

127801 二维磁性材料的物性研究及性能调控 ..... 蒋小红 秦泗晨 幸子越 邹星宇 邓一帆 王伟 王琳

#### 研究论文

127502 轴子拓扑绝缘体候选材料层状  $\text{Eu}_{1-x}\text{Ca}_x\text{In}_2\text{As}_2$  的物性研究 ..... 易恩魁 王彬 沈韩 沈冰

129101  $\text{Fe}_3\text{GeTe}_2/\text{h-BN}/\text{石墨烯}$  二维异质结器件中的高效率自旋注入 ..... 杨维 韩江朝 曹元 林晓阳 赵巍胜

### 专题: 太赫兹生物物理

128201 砷 (III) 对 p53 突变蛋白活性恢复作用的太赫兹物理机制 ..... 唐朝 张广旭 胡钧 吕军鸿

#### 综述

123201 超冷长程 Rydberg-基态分子 ..... 白素英 白景旭 韩小莹 焦月春 赵建明

128804 基于光子晶体的有机太阳能电池研究进展 ..... 兰伟霞 顾嘉陆 高晓辉 廖英杰 钟宋义 张卫东 彭艳 孙钰 魏斌

#### 总论

120201 软体机器人用多孔聚合物水凝胶的摩擦接触非线性行为 ..... 陈康 沈煜年

120301 基于里德伯超级原子快速制备三粒子单重态 ..... 计彦强 王洁 刘颖莉 张大伟 肖瑞杰 董莉 修晓明

120302 纠缠光子对的级联 Hong-Ou-Mandel 干涉研究及其在多时延参数测量中的应用 ..... 翟艺伟 董瑞芳 权润爱 项晓 刘涛 张首刚

120501 耦合前包钦格复合体神经元中复杂混合簇放电的动力学 ..... 赵雅琪 刘谋天 赵勇 段利霞

### 核物理学

122101 铷原子簇自发磁矩的实验观测及理论分析 ..... 邱淑红 张阳 杨会静 伞星原 刘会媛 张素恒 李繁麟 太军君 周春丽

122801  $\text{U}_{1-x}\text{Th}_x\text{O}_2$  混合燃料力学性能的分子动力学模拟 ..... 辛勇 包宏伟 孙志鹏 张吉斌 刘仕超 郭子莹 王浩煜 马飞 李垣明

## 原子和分子物理学

- 123101 柿单宁特征功能基团与金属离子作用的计算分析 … 刘智高 陈涛 胡朝浩 王殿辉 王仲民 李桂银  
123102 硅醚/石墨醚异质结构光电性质的理论研究 … 张颖 刘春生

## 电磁学、光学、声学、传热学、经典力学和流体动力学

- 124201 基于亚波长光栅和三明治结构的偏振无关微环谐振器的设计与仿真 … 汪静丽 张见哲 陈鹤鸣  
124301 黏弹介质包裹的液体腔中气泡的动力学分析 … 张陶然 莫润阳 胡静 陈时 王成会 郭建中  
124302 Doppler-warping 变换及其应用在声学目标运动速度估计 … 高德洋 高大治 迟静 王良 宋文华  
124501 气-液-固三相流混合建模与求解方法 … 范兴华 谭大鹏 李霖 殷梓超 王彤  
124601 二维近零折射率声学材料的负向 Schoch 位移 … 刘向东 吴福根 姚源卫 张欣  
124701 非牛顿流体剪切稀化特性的分子动力学模拟 … 杨刚 郑庭 程启昊 张会臣  
124702 物性参数对液滴的聚并自弹跳的影响及其关联分析 … 王宇航 袁猛 明平剑

## 凝聚物质: 结构、力学和热学性质

- 126101 纳米结构及浸润性对液滴润湿行为的影响 … 李文 马骁婧 徐进良 王艳 雷俊鹏  
126102 离子径迹特征与纳米反相器链单粒子瞬态的关联性研究 … 赵雯 陈伟 罗尹虹 贺朝会 沈忱  
126401 胶体聚合物弹性模量的微观理论: 键长的效应 … 张博凯

## 凝聚物质: 电子结构、电学、磁学和光学性质

- 127505  $\text{Fe}_m\text{B}_{20}$  ( $m = 1, 2$ ) 团簇中超快自旋动力学的第一性原理研究 … 卢欣 谢孟琳 刘景 金蔚 李春 Georgios Lefkidis Wolfgang Hübner  
127701 取向相关的  $\text{Pb}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$  外延薄膜的相图和介电性能 … 白刚 林翠 刘端生 许杰 李卫 高存法  
127702 一阶回转曲线图谱法及其在  $\text{HfO}_2$  基铁电薄膜极化翻转行为研究中的应用 … 石志鑫 周大雨 李帅东 徐进 Uwe Schröder  
127901 真空罐穿舱法兰介质微放电的实验研究 … 王新波 白鹤 孙勤奋 殷新社 张洪太 崔万照

## 物理学交叉学科及有关科学技术领域

- 128101 基于单层二硫化钼的高品质因子、高品质因数的四波段完美吸收器 … 蒋黎英 易颖婷 易早 杨华 李治友 苏炬 周自刚 陈喜芳 易有根  
128401  $\text{Cu}_{1.8-x}\text{Sb}_x\text{S}$  热电材料的相结构与电热输运性能 … 赵英浩 张瑞 张波萍 尹阳 王明军 梁豆豆  
128501 二阶梯度交叉耦合超导量子干涉仪电流传感器研制 … 徐达 钟青 曹文会 王雪深 王仕建 李劲劲 刘建设 陈炜  
128502  $\text{NiO}/\text{GaN}$  p-n 结紫外探测器及自供电技术 … 王顺利 王亚超 郭道友 李超荣 刘爱萍  
128801 空间电荷层效应对固体氧化物燃料电池三相界面附近氧空位传输的影响 … 徐晗 张璐  
128802 高效硫化镉薄膜太阳能电池中的渐变能隙结构 … 曹宇 蒋家豪 刘超颖 凌同 孟丹 周静 刘欢 王俊尧  
128803 2-溴对苯二甲酸钝化的全无机钙钛矿电池的性能 … 林明月 巨博 李燕 陈雪莲

文章图片的彩色效果详见网刊



扫码阅读  
电子版

# ACTA PHYSICA SINICA

Vol. 70, No. 12, June 20, 2021

## CONTENTS

### SPECIAL TOPIC—Two-dimensional magnetic materials

- 120101 Preface to the special topic: Two-dimensional magnetic materials  
*Nie Tian-Xiao Shao Qi-Ming*

### REVIEW

- 127301 Research progress of preparation of large-scale two-dimensional magnetic materials and manipulation of Curie temperature  
*Wang Hai-Yu Liu Ying-Jie Xun Lu-Lu Li Jing Yang Qing Tian Qi-Yun  
Nie Tian-Xiao Zhao Wei-Sheng*
- 127302 Physical problems and experimental progress in layered magnetic topological materials  
*Sun Hui-Min He Qing-Lin*
- 127303 Berry curvature-induced emerging magnetic response in two-dimensional materials  
*Liu Yu-Ting He Wen-Yu Liu Jun-Wei Shao Qi-Ming*
- 127501 Research progress of spin-orbit torques based on two-dimensional materials  
*He Cong-Li Xu Hong-Jun Tang Jian Wang Xiao Wei Jin-Wu Shen Shi-Peng  
Chen Qing-Qiang Shao Qi-Ming Yu Guo-Qiang Zhang Guang-Yu Wang Shou-Guo*
- 127503 Recent development in two-dimensional magnetic materials and multi-field control of magnetism  
*Xiao Han Mi Meng-Juan Wang Yi-Lin*
- 127504 Probe and manipulation of magnetism of two-dimensional CrI<sub>3</sub> crystal  
*Zhang Song-Ge Chen Yu-Tong Wang Ning Chai Yang Long Gen Zhang Guang-Yu*
- 127801 Study on physical properties and magnetism controlling of two-dimensional magnetic materials  
*Jiang Xiao-Hong Qin Si-Chen Xing Zi-Yue Zou Xing-Yu Deng Yi-Fan Wang Wei  
Wang Lin*

### ARTICLE

- 127502 Properties of axion insulator candidate layered Eu<sub>1-x</sub>Ca<sub>x</sub>In<sub>2</sub>As<sub>2</sub>  
*Yi En-Kui Wang Bin Shen Han Shen Bing*
- 129101 Efficient spin injection in Fe<sub>3</sub>GeTe<sub>2</sub>/h-BN/graphene heterostructure  
*Yang Wei Han Jiang-Chao Cao Yuan Lin Xiao-Yang Zhao Wei-Sheng*

### SPECIAL TOPIC—Terahertz biophysics

- 128201 Terahertz physical mechanism of arsenic (III) restoring p53 mutant protein activity  
*Tang Chao Zhang Guang-Xu Hu Jun Lü Jun-Hong*

### REVIEW

- 123201 Ultra-cold long-range Rydberg-ground molecules  
*Bai Su-Ying Bai Jing-Xu Han Xiao-Xuan Jiao Yue-Chun Zhao Jian-Ming*
- 128804 Research progress of organic solar cells based on photonic crystals  
*Lan Wei-Xia Gu Jia-Lu Gao Xiao-Hui Liao Ying-Jie Zhong Song-Yi Zhang Wei-Dong  
Peng Yan Sun Yu Wei Bin*

### GENERAL

- 120201 Nonlinear frictional contact behavior of porous polymer hydrogels for soft robot  
*Chen Kang Shen Yu-Nian*

(Continued)

- 120301 Fast generation of three-atom singlet state with Rydberg superatom  
*Ji Yan-Qiang Wang Jie Liu Ying-Li Zhang Da-Wei Xiao Rui-Jie Dong Li  
 Xiu Xiao-Ming*
- 120302 Cascaded Hong-Ou-Mandel interference of entangled photon pairs and its application in multiple delay parameters measurement  
*Zhai Yi-Wei Dong Rui-Fang Quan Run-Ai Xiang Xiao Liu Tao Zhang Shou-Gang*
- 120501 Dynamics of mixed bursting in coupled pre-Bötzinger complex  
*Zhao Ya-Qi Liu Mou-Tian Zhao Yong Duan Li-Xia*

## NUCLEAR PHYSICS

- 122101 Experimental observation and theoretical analysis of spontaneous magnetic moment of Rb atom clusters  
*Di Shu-Hong Zhang Yang Yang Hui-Jing San Xing-Yuan Liu Hui-Yuan Zhang Su-Heng  
 Li Fan-Lin Tai Jun-Jun Zhou Chun-Li*
- 122801 Effects of Th doping on mechanical properties of  $U_{1-x}Th_xO_2$ : An atomistic simulation  
*Xin Yong Bao Hong-Wei Sun Zhi-Peng Zhang Ji-Bin Liu Shi-Chao Guo Zi-Xuan  
 Wang Hao-Yu Ma Fei Li Yuan-Ming*

## ATOMIC AND MOLECULAR PHYSICS

- 123101 Calculation and analysis of interaction between characteristic functional group of persimmon tannin and metal ions  
*Liu Zhi-Gao Chen Tao Hu Chao-Hao Wang Dian-Hui Wang Zhong-Min Li Gui-Yin*
- 123102 Theoretical study of optical and electronic properties of silicether/graphether heterostructure  
*Zhang Ying Liu Chun-Sheng*

## ELECTROMAGNETISM, OPTICS, ACOUSTICS, HEAT TRANSFER, CLASSICAL MECHANICS, AND FLUID DYNAMICS

- 124201 Design and simulation of polarization-insensitive ring resonator based on subwavelength grating and sandwiched structure  
*Wang Jing-Li Zhang Jian-Zhe Chen He-Ming*
- 124301 Dynamic analysis of bubble in liquid cavity wrapped by viscoelastic medium  
*Zhang Tao-Ran Mo Run-Yang Hu Jing Chen Shi Wang Cheng-Hui Guo Jian-Zhong*
- 124302 Doppler-warping transform and its application to estimating acoustic target velocity  
*Gao De-Yang Gao Da-Zhi Chi Jing Wang Liang Song Wen-Hua*
- 124501 Modeling and solution method of gas-liquid-solid three-phase flow mixing  
*Fan Xing-Hua Tan Da-Peng Li Lin Yin Zi-Chao Wang Tong*
- 124601 Negative Schoch displacement of two-dimensional acoustic metamaterials with near-zero refractive index  
*Liu Xiang-Dong Wu Fu-Gen Yao Yuan-Wei Zhang Xin*
- 124701 Molecular dynamics simulation on shear thinning characteristics of non-Newtonian fluids  
*Yang Gang Zheng Ting Cheng Qi-Hao Zhang Hui-Chen*
- 124702 Effect and relational analysis of physical parameters on coalescence-induced self-propelled jumping of droplets  
*Wang Yu-Hang Yuan Meng Ming Ping-Jian*

## CONDENSED MATTER: STRUCTURAL, MECHANICAL, AND THERMAL PROPERTIES

- 126101 Effects of base angle and wettability of nanostructures on droplet wetting behaviors  
*Li Wen Ma Xiao-Jing Xu Jin-Liang Wang Yan Lei Jun-Peng*
- 126102 Relationship between ion track characteristics and single event transients in nanometer inverter chain  
*Zhao Wen Chen Wei Luo Yin-Hong He Chao-Hui Shen Chen*

(Continued)

- 126401 Microscopic theory for elastic modulus of colloidal polymers: Effect of bond length  
*Zhang Bo-Kai*

## CONDENSED MATTER: ELECTRONIC STRUCTURE, ELECTRICAL, MAGNETIC, AND OPTICAL PROPERTIES

- 127505 First-principles study of ultrafast spin dynamics in  $\text{Fe}_m\text{B}_{20}$  ( $m = 1, 2$ ) clusters  
*Lu Xin Xie Meng-Lin Liu Jing Jin Wei Li Chun Georgios Lefkidis Wolfgang Hübner*
- 127701 Phase diagram and dielectric properties of orientation-dependent  $\text{PbZr}_{0.52}\text{Ti}_{0.48}\text{O}_3$  epitaxial films  
*Bai Gang Lin Cui Liu Duan-Sheng Xu Jie Li Wei Gao Cun-Fa*
- 127702 First-order reversal curve diagram and its application in investigation of polarization switching behavior of  $\text{HfO}_2$ -based ferroelectric thin films  
*Shi Zhi-Xin Zhou Da-Yu Li Shuai-Dong Xu Jin Uwe Schröder*
- 127901 Experimental study of multipactor on dielectric of penetration flange for vacuum chamber  
*Wang Xin-Bo Bai He Sun Qin-Fen Yin Xin-She Zhang Hong-Tai Cui Wan-Zhao*

## INTERDISCIPLINARY PHYSICS AND RELATED AREAS OF SCIENCE AND TECHNOLOGY

- 128101 A four-band perfect absorber based on high quality factor and high figure of merit of monolayer molybdenum disulfide  
*Jiang Li-Ying Yi Ying-Ting Yi Zao Yang Hua Li Zhi-You Su Ju Zhou Zi-Gang Chen Xi-Fang Yi You-Gen*
- 128401 Phase structure and thermoelectric properties of  $\text{Cu}_{1.8-x}\text{Sb}_x\text{S}$  thermoelectric material  
*Zhao Ying-Hao Zhang Rui Zhang Bo-Ping Yin Yang Wang Ming-Jun Liang Dou-Dou*
- 128501 A second-order gradiometric superconducting quantum interference device current sensor with cross-coupled structure  
*Xu Da Zhong Qing Cao Wen-Hui Wang Xue-Shen Wang Shi-Jian Li Jin-Jin Liu Jian-She Chen Wei*
- 128502 NiO/GaN p-n junction ultraviolet photodetector and self-powered technology  
*Wang Shun-Li Wang Ya-Chao Guo Dao-You Li Chao-Rong Liu Ai-Ping*
- 128801 Influences of space charge layer effect on oxygen vacancy transport adjacent to three phase boundaries within solid oxide fuel cells  
*Xu Han Zhang Lu*
- 128802 Bandgap grading of  $\text{Sb}_2(\text{S},\text{Se})_3$  for high-efficiency thin-film solar cells  
*Cao Yu Jiang Jia-Hao Liu Chao-Ying Ling Tong Meng Dan Zhou Jing Liu Huan Wang Jun-Yao*
- 128803 Performance of 2-bromoterephthalic acid passivated all-inorganic perovskite cells  
*Lin Ming-Yue Ju Bo Li Yan Chen Xue-Lian*

Color figures can be viewed in the online issue.



Online issue