

# 物 理 学 报

第 70 卷 第 10 期 2021 年 5 月 20 日

## 目 次

### 专题: 柔性电子

- 100703 柔性压阻式压力传感器的研究进展 ..... 李凤超 孔振 吴锦华 纪欣宜 梁嘉杰  
100705 基于纳米发电机的触觉传感在柔性可穿戴电子设备中的研究与应用 ..... 王闯 鲍容容 潘曹峰

### 总论

- 100201 Jaynes-Cummings 晶格模型和 Rabi 晶格模型的量子相变 ... 尤冰凌 刘雪莹 成书杰 王晨 高先龙  
100301 级联环境下三量子比特量子关联动力学研究 ..... 宋悦 李军奇 梁九卿  
100701 基于镂空阵列探头的反射式光声/热声双模态组织成像 .....  
..... 谢实梦 黄林 王雪 迟子惠 汤永辉 郑铸 蒋华北  
100702 一种不确定性捆扎线束电磁耦合效应的广义等效建模方法 .....  
..... 肖培 李佳维 贺佳港 李锦新 刘柱 李高升  
100704 高精度双斜坡辅助式混沌布里渊光纤动态应变传感 .....  
..... 王亚辉 赵乐 胡鑫鑫 郭阳 张建忠 乔丽君 王涛 高少华 张明江  
100706 基于介观元胞自动机的城市区域人员疏散模拟方法 ..... 吕伟 汪京辉 房志明 毛盾

### 核物理学

- 102101 原子核质量模型的检验 ..... 李涛 黎春青 周厚兵 王宁

### 原子和分子物理学

- 103201 基于里德伯原子电磁诱导透明效应的光脉冲减速 ... 赵嘉栋 张好 杨文广 赵婧华 景明勇 张临杰  
103301 一个可靠和准确的光电产额谱模型及应用 ..... 刘昶时

### 电磁学、光学、声学、传热学、经典力学和流体动力学

- 104101 抑制傅里叶变换法恢复的 X 射线相衬像中的伪影 ..... 杨君 吴浩 罗琨皓 郭金川 宗方轲  
104201 全偏振大气偏振模式成像系统的设计与优化分析 ..... 王成 范之国 金海红 汪先球 华豆  
104202 皮秒拍瓦激光系统宽带激光放大的精确模型和性能分析 .....  
..... 李大为 王韬 尹晓蕾 李佳美 王利 张腾 张天雄 崔勇 卢兴强 王丽 张杰 徐光  
104203 多功能量子远程传态网络 ..... 周瑶瑶 刘艳红 闫智辉 贾晓军  
104204 基于简并四波混频的双信道双频段增益谱 ..... 王丹 郭瑞翔 戴玉鹏 周海涛  
104205 基于激光器阵列后处理的混沌熵源获取高品质随机数 .....  
..... 吴佳辰 宋峥 谢溢锋 周心雨 周沛 穆鹏华 李念强  
104206 铋黄铜中微量元素的高重复频率激光剥离-火花诱导击穿光谱定量分析 .....  
..... 黄梅婷 姜银花 陈钰琦 李润华  
104207 利用数值模拟研究表面增强相干反斯托克斯拉曼散射增强基底 ..... 李健康 李睿  
104208 一种具有低串扰低非线性的双沟槽环绕型十三芯五模光纤 .....  
..... 李增辉 李曙光 李建设 王璐瑶 王晓凯 王彦 龚琳 程同蕾  
104301 旋涡声散射特性的尺度效应数值研究 ..... 马瑞轩 王益民 张树海 武从海 王勋年  
104401 周期性分流微通道的结构设计及散热性能 ..... 王晗 袁礼 王超 王如志

## 气体、等离子体和放电物理

- 105201 外电极长度对同轴枪放电等离子体特性的影响 ..... 宋健 李嘉雯 白晓东 张津硕 闫慧杰 肖青梅 王德真

## 凝聚物质: 结构、力学和热学性质

- 106101 多壁碳纳米管与金属表面间接接触行为的分子动力学模拟 ... 杨权 马立 耿松超 林旸旸 陈涛 孙立宁  
106201 含钨难熔高熵合金的制备、结构与性能 ..... 黄文军 乔璐威 陈顺华 王雪姣 吴玉程  
106801 液滴撞击超亲水表面的最大铺展直径预测模型 ... 春江 王瑾莹 徐晨 温荣福 兰忠 马学虎

## 凝聚物质: 电子结构、电学、磁学和光学性质

- 107101 飞秒传输表面等离激元的近场成像表征与激发效率的调控 ..... 赵翔宇 秦榆禄 季博宇 郎鹏 宋晓伟 林景全  
107301 超电容储能电极材料的密度泛函理论研究 ..... 徐强 司雪 余维汉 杨光敏  
107302 MgO 基磁性隧道结温度-偏压相图的理论研究 ..... 吕杰 方贺男 吕涛涛 孙星宇  
107303 多组元掺杂提升  $\text{Cu}_3\text{SbSe}_4$  基固溶体的热电性能 ..... 王莫凡 应鹏展 李颢 崔教林  
107501 一种具有“1111”型结构的新型稀磁半导体  $(\text{La}_{1-x}\text{Sr}_x)(\text{Zn}_{1-x}\text{Mn}_x)\text{SbO}$  ..... 张浩杰 张茹菲 傅立承 顾轶伦 智国翔 董金瓯 赵雪芹 宁凡龙  
107502 切边纳米铁磁盘对中磁涡旋性的磁场调控 ..... 马晓萍 杨宏国 李昌锋 刘有继 朴红光  
107801 面外取向的  $(\text{BiTm})_3(\text{GaFe})_5\text{O}_{12}$  磁光单晶薄膜制备及取向机理分析 ..... 杨雪 杨青慧 张怀武 文岐业 白飞明 钟智勇 张鼎 黄建涛

## 物理学交叉学科及有关科学技术领域

- 108401 基于晶向优化和 Sn 合金化技术的一种 2.45 G 弱能量微波无线输能用 Ge 基肖特基二极管 ..... 宋建军 张龙强 陈雷 周亮 孙雷 兰军峰 习楚浩 李家豪  
108402 Peltier 效应: 从线性到非线性 ..... 杨振 朱璨 柯亚娇 何雄 罗丰 王剑 王嘉赋 孙志刚  
108501  $\text{Mg}_2\text{Si}/\text{Si}$  雪崩光电二极管的设计与模拟 ..... 王傲霜 肖清泉 陈豪 何安娜 秦铭哲 谢泉  
108801 Si 衬底  $\text{Cu}_2\text{ZnSnS}_4$  太阳能电池的数值分析 ..... 刘辉城 许佳雄 林俊辉  
108901 基于时序网络层间同构率动态演化的重要节点辨识 ..... 胡钢 许丽鹏 徐翔

## 地球物理学、天文学和天体物理学

- 109201 热带沿海地区一次局地雷暴消散阶段的云内电场 ... 余海 张廷龙 陈阳 吕伟涛 赵小平 陈洁  
109601 太阳宇宙线地面增强事件 (GLE72) 峰值能谱研究 ..... 张云峰 贾焕玉 王辉

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. 10, May 20, 2021

## CONTENTS

### SPECIAL TOPIC—Flexible electronics

- 100703 Advances in flexible piezoresistive pressure sensor  
*Li Feng-Chao Kong Zhen Wu Jin-Hua Ji Xin-Yi Liang Jia-Jie*
- 100705 Research and application of flexible wearable electronics based on nanogenerator in touch sensor  
*Wang Chuang Bao Rong-Rong Pan Cao-Feng*

### GENERAL

- 100201 The quantum phase transition in the Jaynes-Cummings lattice model and the Rabi lattice model  
*You Bing-Ling Liu Xue-Ying Cheng Shu-Jie Wang Chen Gao Xian-Long*
- 100301 Dynamics of quantum correlation for three qubits in hierarchical environment  
*Song Yue Li Jun-Qi Liang Jiu-Qing*
- 100701 Reflection mode photoacoustic/thermoacoustic dual modality imaging based on hollow concave array  
*Xie Shi-Meng Huang Lin Wang Xue Chi Zi-Hui Tang Yong-Hui Zheng Zhu Jiang Hua-Bei*
- 100702 A generalized simplified modeling method for electromagnetic coupling effects of uncertainty strapping cable harness  
*Xiao Pei Li Jia-Wei He Jia-Gang Li Jin-Xin Liu Zhu Li Gao-Sheng*
- 100704 High-accuracy dual-slope-assisted chaotic Brillouin fiber dynamic strain measurement  
*Wang Ya-Hui Zhao Le Hu Xin-Xin Guo Yang Zhang Jian-Zhong Qiao Li-Jun Wang Tao Gao Shao-Hua Zhang Ming-Jiang*
- 100706 Simulation method of urban evacuation based on mesoscopic cellular automata  
*Lü Wei Wang Jing-Hui Fang Zhi-Ming Mao Dun*

### NUCLEAR PHYSICS

- 102101 Test of nuclear mass models  
*Li Tao Li Chun-Qing Zhou Hou-Bing Wang Ning*

### ATOMIC AND MOLECULAR PHYSICS

- 103201 Deceleration of optical pulses based on electromagnetically induced transparency of Rydberg atoms  
*Zhao Jia-Dong Zhang Hao Yang Wen-Guang Zhao Jing-Hua Jing Ming-Yong Zhang Lin-Jie*
- 103301 A reliable and accurate model of photoelectron yield spectrum and its applications  
*Liu Chang-Shi*

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

- 104101 Suppression of artifacts in X-ray phase-contrast images retrieved by Fourier transform  
*Yang Jun Wu Hao Luo Kun-Hao Guo Jin-Chuan Zong Fang-Ke*

(Continued)

- 104201 Design and optimization analysis of imaging system of polarized skylight pattern of full polarization  
*Wang Cheng Fan Zhi-Guo Jin Hai-Hong Wang Xian-Qiu Hua Dou*
- 104202 Accurate model and performance analysis of broadband pulsed amplification in picosecond petawatt laser system  
*Li Da-Wei Wang Tao Yin Xiao-Lei Li Jia-Mei Wang Li Zhang Teng Zhang Tian-Xiong Cui Yong Lu Xing-Qiang Wang Li Zhang Jie Xu Guang*
- 104203 A multifunctional quantum teleportation network  
*Zhou Yao-Yao Liu Yan-Hong Yan Zhi-Hui Jia Xiao-Jun*
- 104204 Degenerate four-wave mixing-based double-channel optical gain spectrum with two frequency bands  
*Wang Dan Guo Rui-Xiang Dai Yu-Peng Zhou Hai-Tao*
- 104205 High-quality random number sequences extracted from chaos post-processed by phased-array semiconductor laser  
*Wu Jia-Chen Song Zheng Xie Yi-Feng Zhou Xin-Yu Zhou Pei Mu Peng-Hua Li Nian-Qiang*
- 104206 Quantitative analysis of trace elements in bismuth brass with high repetition rate laser-ablation spark-induced breakdown spectrum  
*Huang Mei-Ting Jiang Yin-Hua Chen Yu-Qi Li Run-Hua*
- 104207 Numerical simulation study of surface enhancement coherent anti-Stokes Raman scattering reinforced substrate  
*Li Jian-Kang Li Rui*
- 104208 Double-trench assisted thirteen-core five-mode fibers with low crosstalk and low non-linearity  
*Li Zeng-Hui Li Shu-Guang Li Jian-She Wang Lu-Yao Wang Xiao-Kai Wang Yan Gong Lin Cheng Tong-Lei*
- 104301 Numerical investigation of scale effect on acoustic scattering by vortex  
*Ma Rui-Xuan Wang Yi-Min Zhang Shu-Hai Wu Cong-Hai Wang Xun-Nian*
- 104401 Structure and thermal properties of periodic split-flow microchannels  
*Wang Han Yuan Li Wang Chao Wang Ru-Zhi*

## PHYSICS OF GASES, PLASMAS, AND ELECTRIC DISCHARGES

- 105201 Effect of length of outer electrode on plasma characteristics in coaxial gun  
*Song Jian Li Jia-Wen Bai Xiao-Dong Zhang Jin-Shuo Yan Hui-Jie Xiao Qing-Mei Wang De-Zhen*

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

- 106101 Molecular dynamics simulation of contact behaviors between multiwall carbon nanotube and metal surface  
*Yang Quan Ma Li Geng Song-Chao Lin Yi-Ni Chen Tao Sun Li-Ning*
- 106201 Preparation, structures and properties of tungsten-containing refractory high entropy alloys  
*Huang Wen-Jun Qiao Jun-Wei Chen Shun-Hua Wang Xue-Jiao Wu Yu-Cheng*
- 106801 Theoretical model of maximum spreading diameter on superhydrophilic surfaces  
*Chun Jiang Wang Jin-Xuan Xu Chen Wen Rong-Fu Lan Zhong Ma Xue-Hu*

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

- 107101 Near-field imaging of femtosecond propagating surface plasmon and regulation of excitation efficiency  
*Zhao Xiang-Yu Qin Yu-Lu Ji Bo-Yu Lang Peng Song Xiao-Wei Lin Jing-Quan*

(Continued)

- 107301 Density functional theory study of supercapacitor for energy storage electrode materials  
*Xu Qiang Si Xue She Wei-Han Yang Guang-Min*
- 107302 Theoretical study on temperature-bias phase diagram of MgO-based magnetic tunnel junctions  
*Lü Jie Fang He-Nan Lü Tao-Tao Sun Xing-Yu*
- 107303 Polycomponent doping improved thermoelectric performance of  $\text{Cu}_3\text{SbSe}_4$ -based solid solutions  
*Wang Mo-Fan Ying Peng-Zhan Li Xie Cui Jiao-Lin*
- 107501  $(\text{La}_{1-x}\text{Sr}_x)(\text{Zn}_{1-x}\text{Mn}_x)\text{SbO}$ : A novel 1111-type diluted magnetic semiconductor  
*Zhang Hao-Jie Zhang Ru-Fei Fu Li-Cheng Gu Yi-Lun Zhi Guo-Xiang Dong Jin-Ou Zhao Xue-Qin Ning Fan-Long*
- 107502 Control of magnetic vortex circulation in one-side-flat nanodisk pairs by in-plane magnetic field  
*Ma Xiao-Ping Yang Hong-Guo Li Chang-Feng Liu You-Ji Piao Hong-Guang*
- 107801 Preparation and orientation mechanism analysis of  $(\text{BiTm})_3(\text{GaFe})_5\text{O}_{12}$  magneto-optical single crystal film with out-of-plane orientation  
*Yang Xue Yang Qing-Hui Zhang Huai-Wu Wen Qi-Ye Bai Fei-Ming Zhong Zhi-Yong Zhang Ding Huang Jian-Tao*

## INTERDISCIPLINARY PHYSICS AND RELATED AREAS OF SCIENCE AND TECHNOLOGY

- 108401 A Ge-based Schottky diode for 2.45 G weak energy microwave wireless energy transmission based on crystal orientation optimization and Sn alloying technology  
*Song Jian-Jun Zhang Long-Qiang Chen Lei Zhou Liang Sun Lei Lan Jun-Feng Xi Chu-Hao Li Jia-Hao*
- 108402 Peltier effect: From linear to nonlinear  
*Yang Zhen Zhu Can Ke Ya-Jiao He Xiong Luo Feng Wang Jian Wang Jia-Fu Sun Zhi-Gang*
- 108501 Design and simulation of  $\text{Mg}_2\text{Si}/\text{Si}$  avalanche photodiode  
*Wang Ao-Shuang Xiao Qing-Quan Chen Hao He An-Na Qin Ming-Zhe Xie Quan*
- 108801 Numerical analysis of  $\text{Cu}_2\text{ZnSnS}_4$  solar cells on Si substrate  
*Liu Hui-Cheng Xu Jia-Xiong Lin Jun-Hui*
- 108901 Identification of important nodes based on dynamic evolution of inter-layer isomorphism rate in temporal networks  
*Hu Gang Xu Li-Peng Xu Xiang*

## GEOPHYSICS, ASTRONOMY, AND ASTROPHYSICS

- 109201 Vertical electrical field during decay stage of local thunderstorm near coastline in tropical island  
*Yu Hai Zhang Ting-Long Chen Yang Lü Wei-Tao Zhao Xiao-Ping Chen Jie*
- 109601 Research on the peak energy spectrum of the solar cosmic ray ground level enhancement event (GLE72)  
*Zhang Yun-Feng Jia Huan-Yu Wang Hui*

Color figures can be viewed in the online issue.



Online issue