

RCCSE中国准核心学术期刊  
全国高校实验室工作研究会会刊

ISSN 1672-4550  
CN 51-1653/N  
CODEN SKYJA9

# 实验科学与技术

## Experiment Science and Technology

2020

3

第18卷 第3期  
Vol. 18 No. 3

第十八卷 第三期 (总第 18 期)

二〇二〇年六月

ISSN 1672-4550



## 目 次

### 实验技术

- 强流电子束产生与应用测量系统研究.....胡 标, 孙振海, 汪海洋, 李 浩, 周翼鸿, 尹文骁, 李天明 ( 1 )  
高质量扫描透射电子显微镜高角环形暗场像的实验关键点.....郝龙龙, 覃丽禄 ( 7 )  
综合组网实验的设计与实现.....边胜琴, 王建萍, 张力军, 王洪泊, 崔晓龙 ( 11 )  
基于解析法的交流电机电枢绕组磁动势研究.....王 吴 ( 18 )  
基于一阶和二阶电路实现波形变换实验研究.....彭 霞, 李延平, 周细凤, 胡鹤宇, 陈意军 ( 22 )  
基于微信小程序的在线学习平台设计与实现.....周 萌, 厉旭杰, 陈凯杰, 邵嘉诚 ( 27 )  
岩石直接拉伸试验夹具的改进及其试验方法.....覃 黎, 刘 洋, 张朝鹏, 艾 婷, 张文举 ( 33 )  
提高膜片钳实验成功率的方法研究.....潘一会, 王 君, 尚 蕾, 李 虹, 邹远文 ( 38 )  
基于单片机的音乐喷泉设计.....杨蕴哲, 李昌禄, 杨业昆, 张 倪, 晁志腾 ( 43 )

### 实验教学

- 面向专业学位的网络信息安全案例库建设研究.....唐成华, 汪华登, 姚 罡 ( 50 )  
面向新工科的层次化实验教学体系设计与实践.....董桂伟, 赵国群, 王桂龙, 郑 超 ( 55 )  
工业工程专业复合型创新人才培养实践教学体系质量评估与改进.....李 民, 辛 博, 朱张青 ( 59 )  
“误差理论与测量数据处理”课程一体化的研究与探索.....罗清华, 焉晓贞, 彭 宇, 彭喜元, 王 翊, 宋 佳, 邓立宝 ( 66 )  
贯通动物解剖与厌氧微生物培养的实验教学改革.....李佛生, 晏仕英, 赵森森, 周 洁, 熊 莉, 汪 红, 赵 建 ( 70 )  
适于层次化教学的直流电机控制系统设计与应用.....高庆华, 商云晶, 崔承毅, 赵权科, 吴雅楠 ( 75 )  
新工科背景下航空油料专业实验教学体系研究.....刘 翔, 陈勇刚, 杨月新, 贺元骅, 冯鹏宇 ( 79 )  
基于“双创”平台建设高分子材料专业创新创业实验课程.....田晨旭, 蔡绪福, 杨昌跃, 李艳梅, 姜猛进 ( 84 )  
工程教育下机械创新实验教学研究与实践.....周 龙, 郑岳久, 刘建国, 来 鑫, 王 飞 ( 89 )  
基于故障电路的“逆向”思维实验教学模式.....印 月, 周 群 ( 95 )  
“探究式小班教学”对大学生学习效果的影响研究.....张 帆, 尹 璐 ( 100 )  
基于“科教融合”的化学生物学综合实验设计.....刘艳红, 李 静, 王 娜 ( 104 )  
荧光量子效率测定的综合实验设计.....王 娜, 杨 洪, 王良臣, 熊婷婷 ( 109 )  
基于云计算的跨校区计算机通识课程实验教学研究.....熊 念, 周 珊, 刘小丽, 陆尧胜 ( 114 )  
AlN薄膜制备与表征研究型实验设计.....陶鹏程, 梁红伟, 夏晓川, 黄火林 ( 118 )  
基于CDIO工程教育模式的理科人才培养研究.....程春雨, 商云晶, 马 驰, 王开宇, 吴雅楠 ( 123 )  
“创客教育”与“互联网+课堂”在高校产品设计模型实践课程中的融合.....冯亚娟, 何灿群, 严 波, 周 丰, 安翠翠 ( 128 )

### 实验仪器研制

- 基于新型激光干涉仪的玻璃测厚实验装置.....王晓娜, 陈 珂, 周新磊, 陶鹏程 ( 134 )  
LED可见光通信演示实验装置的设计与研制.....胡姗姗, 吴彦达, 刘树钰, 陈文娟 ( 140 )

### 实验室建设与管理

- 以实验案例设计竞赛为抓手促进实验教师队伍建设.....刘 畔, 沈 瑶, 原晓楠, 金印彬, 高昕悦, 陈 琪 ( 145 )  
高射程喷雾机优化设计虚拟仿真实验平台开发.....陈吉朋, 刘 英, 许林云, 蒋雪松, 周宏平, 陈 军 ( 150 )  
“双一流”战略背景下药学创新人才平台建设.....李 玲, 苏国琛, 李 坤, 谢春锋 ( 155 )

## CONTENTS

### Experiment Technology

- Research on the Measurement System of Generation and Application of Intensive Electron Beams ..... HU Biao, SUN Zhenhai, WANG Haiyang, LI Hao, ZHOU Yihong, YIN Wenxiao, LI Tianming ( 1 )  
The Experimental Key Points in Acquiring High Quality HAADF-STEM Images ..... HAO Longlong, QIN Lilu ( 7 )  
Design and Implementation of Comprehensive Networking Experiment ..... BIAN Shengqin, WANG Jianping, ZHANG Lijun, WANG Hongbo, CUI Xiaolong ( 11 )  
Research on Magnetic Momentum of AC Motor Armature Winding Based on Analytical Method ..... WANG Hao ( 18 )  
Experimental Research on Waveform Transformation Based on First-order and Second-order Circuits ..... PENG Xia, LI Yanping, ZHOU Xifeng, HU Heyu, CHEN Yijun ( 22 )  
Design and Implementation of Online Learning Platform Based on WeChat Mini Program ..... ZHOU Meng, LI Xujie, CHEN Kaijie, SHAO Jiacheng ( 27 )  
Improvement of Rock Direct Tensile Test Fixture and Its Experimental Method ..... QIN Li, LIU Yang, ZHANG Zhaopeng, AI Ting, ZHANG Wenju ( 33 )  
Research on the Method of Improving the Success Rate of Patch Clamp Experiment ..... PAN Yihui, WANG Jun, SHANG Lei, LI Hong, ZOU Yuanwen ( 38 )  
Design of a Music Fountain Based on SCM ..... YANG Yunzhe, LI Changlu, YANG Yekun, ZHANG Ni, CHAO Zhiteng ( 43 )

### Experiment Teaching

- Research on the Construction of Network Information Security Case Database for Professional Degree ..... TANG Chenghua, WANG huadeng, YAO Gang ( 50 )  
Design and Practice of Hierarchical Experimental Teaching System for Emerging Engineering ..... DONG Guiwei, ZHAO Guoqun, WANG Guilong, ZHENG Chao ( 55 )  
Quality Evaluation and Improvement of the Practice Teaching System for the Cultivation of Compound Innovative Talents of Industrial Engineering Specialty ..... LI Min, XIN Bo, ZHU Zhangqin ( 59 )  
Research and Exploration on the Integration of “Error Theory and Measurement Data Processing” Course ..... LUO Qinghua, YAN Xiaozhen, PENG Yu, PENG Xiyuan, WANG Zhu, SONG Jia, DENG Libao ( 66 )  
Experimental Teaching Reform of Integrating Animal Anatomy and Anaerobic Microorganism Culture ..... LI Fosheng, YAN Shiying, ZHAO Miaomiao, ZHOU Jie, XIONG Li, WANG Hong, ZHAO Jian ( 70 )  
Design and Application of a DC Motor Control System Suitable for Hierarchical Teaching ..... GAO Qinghua, SHANG Yunjing, CUI Chengyi, ZHAO Quanke, WU Yanan ( 75 )  
Research on the Experimental Teaching System of Aviation Fuel Specialty under the Background of Emerging Engineering Education ..... LIU Xiang, CHEN Yonggang, YANG Yuexin, HE Yuanhua, FENG Pengyu ( 79 )  
Construction of Innovation and Entrepreneurship Experiment Curriculum Based on “Double Innovation” Platform for Polymer Material Specialty ..... TIAN Chenxu, CAI Xufu, YANG Changyue, LI Yanmei, JIANG Mengjing ( 84 )  
Research and Practice of Mechanical Innovation Experiment Teaching under Engineering Education ..... ZHOU Long, ZHENG Yuejiu, LIU Jianguo, LAI Xin, WANG Fei ( 89 )  
Experiment Teaching Mode of “Reverse” Thinking Based on Fault Circuit ..... YIN Yue, ZHOU Qun ( 95 )  
Research on the Effect of “Inquiry-based Small Class Teaching” on College Students’ Learning Effects ..... ZHANG Fan, YIN Lu ( 100 )  
Comprehensive Experimental Design of Chemical Biology Based on “Science and Education Integration” ..... LIU Yanhong, LI Jing, WANG Na ( 104 )  
Comprehensive Experimental Design for Fluorescence Quantum Efficiency Measurement ..... WANG Na, YANG Hong, WANG Liangchen, XIONG Tingting ( 109 )  
Research on Experimental Teaching of Computer General Courses in Cross-campus Based on Cloud Computing ..... XIONG Nian, ZHOU Shan, LIU Xiaoli, LU Yaosheng ( 114 )  
Design of Research-oriented Experiment for Preparation and Characterization of AlN Film ..... TAO Pengcheng, LIANG Hongwei, XIA Xiaochuan, HUANG Huolin ( 118 )  
Research on Science Talent Training Based on CDIO Engineering Education Mode ..... CHENG Chunyu, SHANG Yunjing, MA Chi, WANG Kaiyu, WU Yanan ( 123 )  
Integration of “Maker Education” and “Internet + Course” in the Practical Course of “Product Design Model” in Colleges and Universities ..... FENG Yajuan, HE Canqun, YAN Bo, ZHOU Feng, AN Cuicui ( 128 )

### Experiment Equipments Research

- Experimental Device for Glass Thickness Measurement Based on a Novel Laser Interferometer ..... WANG Xiaona, CHEN Ke, ZHOU Xinlei, TAO Pengcheng ( 134 )  
Design and Development of LED Visible Light Communication Demonstration Experimental Device ..... HU Shanshan, WU Yanda, LIU Shuyu, CHEN Wenjuan ( 140 )

### Laboratory Construction and Management

- Promoting the Construction of Experimental Teacher Team Through the Experimental Case Design Competition ..... LIU Ye, SHEN Yao, YUAN Xiaonan, JIN Yinbin, GAO Xinyue, CHEN Qi ( 145 )  
Development of Virtual Simulation Experiment Platform for the Optimization Design of High-range Air-assisted Sprayer ..... CHEN Jipeng, LIU Ying, XU Linyun, JIANG Xuesong, ZHOU Hongping, CHEN Jun ( 150 )  
Construction of the Pharmaceutical Innovation Talents Platform under the “Double First-class” Strategy ..... LI Ling, SU Guochen, LI Shen, XIE Chunfeng ( 155 )