



工程塑料应用

Gongcheng Suliao Yingyong

ENGINEERING PLASTICS APPLICATION



TIANGANG
Specialty Chemicals

让塑料用的更久™ Make Polymers Last Longer™

天罡®·光稳定剂

Tiangang® UV Light Stabilizers

天罡®系列光稳定剂可有效延缓聚合物的光氧老化，提升聚合物制品的耐候性；可广泛应用于各种中高档通用塑料、工程塑料、纤维织物、涂料及油墨等领域，防止制品由光热老化引起的机械强度下降、表面粉化、开裂、褪色、黄变等现象的发生。

北京天罡助剂，专注于聚合物高性能助剂生产、研发，是亚洲区内最大的受阻胺类光稳定剂生产企业之一，凝聚逾二十年光稳定剂行业经验，设有“聚合物防老化应用实验室”，可全方位协助客户合理选择防老化体系，从而提升客户产品市场竞争力。

Tiangang® T系列光稳定剂

—— 经过实践证明的汽车材料防老化最优光稳定剂解决方案：

极低添加量、更高耐候性、更好满足VOC及表面不发粘等环保严苛要求；包括Tiangan®T-81、Tiangan®T-78、Tiangan®T-70等。

北京天罡助剂有限责任公司

Beijing Tiangan Auxiliary Co., Ltd.

业务部地址：北京市丰台区南三环东路6号嘉业大厦B座2001-02室

电子邮件：tiangan@bjtiangan.com

电话：010-6760 4525, 67683617

www.bjtiangan.com



服务电话 Toll free tel

4000 944 362

ISSN 1001-3539



中国兵器工业集团第五三研究所
中国兵工学会非金属专业委员会
兵器工业非金属材料专业情报网

主办



2021
第49卷
· 月刊 · **10**

目次

材料与应用

- PC/铜负载氧化石墨烯复合材料的力学及抗菌性能·····梁佳丰,郭建强,李岳,等(1)
- 基于层层自组装多层膜的耐用性超滑导管制备·····程静,陈苏仰,孙文文,等(6)
- 有机硅改性 PMMA 壁材相变储能微胶囊制备与性能·····王中立,胡先海,吴礼丽,等(12)
- PLA/硫酸钙晶须复合材料制备及其性能·····高金玲,李媛,储则中,等(17)
- PUF/碳基气凝胶复合材料的压阻性能·····翟天亮,李江浩,王兴义,等(24)
- PVAL/卡拉胶复合纤维的制备及性能·····韩笑,王玲,翟洪杰,等(29)
- 羧基型配位复合弹性体制备及性能·····赵雅晴,田国锋,武嘉,等(34)
- 熔融酯交换法合成聚碳酸酯预聚体·····王金(39)
- PPE 改性液晶高分子及其吹膜性能·····王雄伟,周玉波,楚少生,等(44)
- 低密度聚酰胺/PP 复合材料制备与性能·····徐显骏,杨硕,叶少勇,等(50)

加工

- 材料配方对光聚合注射成型制品收缩演化规律影响·····宋乐,李明昊,李正典,等(56)
- 响应曲面法碳化硅增强光敏树脂制件工艺·····宗学文,刘亮晶,倪铭佑,等(61)
- 基于正交试验优化 PLA 的 3D 打印工艺参数·····郑玲,邓鑫,焦晓岚,等(68)
- 医用熔喷/水刺非织造材料的热复合工艺及其液体非对称传输性能·····王国锋,孙焕惟,张恒,等(73)
- 超薄 CF 平纹织物复合材料热压罐成型高精度天线反射面·····刘明昌,李建伟,孙坤,等(81)
- 后防擦条大流长比注塑参数优化及试验验证·····张华龙,张二红,苏海洋,等(88)

机械与模具

- 商用车外视镜镜框注塑模具设计·····张世阳,陈荣创,高广宇,等(93)
- 香水瓶盖蜗杆螺纹机构模具及检测夹具设计·····蔡艳,熊建武,唐锋,等(98)

测试与老化

- 凹凸棒石和硅灰石对 PTFE 摩擦磨损行为影响·····吴迪,赵福燕,李桂金,等(102)
- PE-HD 植被网与单层土工网的拉伸性能·····刘录良,乔建刚,窦远明(110)
- 玻纤增强 UP 基复合材料大巴空调罩力学性能·····刘阔,吴凤楠,贾志欣,等(115)
- 通用级和纺丝级聚甲醛对比分析·····乃国星,张彩霞,孙亚楠,等(120)

填料与助剂

- DOPO 基聚磷酰胺的合成及阻燃 PLA 性能·····黄绍文,龙丽娟,王彦文,等(124)
- 扩链剂增容 PBAT/PLA 共混体系结构及性能·····赵海鹏,胡顺朋,夏学莲,等(131)
- 接枝聚合物分子链氧化石墨合成及其改性碳纤维·····崔海峰,周晓东(138)
- 超细氢氧化镁在 PVC 压延膜中应用·····彭鹤松,吴维冰,邱文福,等(143)
- 阻燃型室内用木塑复合材料制备与性能·····张爱丽,林梅(148)

综述

- 纤维增强塑料在公路工程中的研究进展·····刘淑艳,崔洪军,张朝阳,等(153)
- 苯并噁嗪树脂在阻燃领域研究进展·····王国荣,李瑜,梅志远,等(161)
- 基于静电纺丝技术 PAN 基碳纳米纤维膜性能及应用研究进展·····于倩倩,陈刚,王启芬,等(166)



工程塑料应用

月刊·公开发行·1973年创刊

第 49 卷,第 10 期

(总第 384 期)

2021 年 10 月 10 日出版

主管 中国兵器工业集团有限公司
主办 中国兵器工业集团第五三研究所
中国兵工学会非金属专业委员会
兵器工业金属材料专业情报网

编辑·出版《工程塑料应用》编辑部

社长·主编 王金立

执行主编 张振

通讯地址 济南市天桥区田庄东路 3 号

邮政编码 250031

电话 编辑部:0531-85878057

广告部:0531-85878220

发行部:0531-85878223

网络光盘部:0531-85878224

传真 0531-85947355

电子信箱 epa@epa1973.com

网址 www.epa1973.com

www.epa1973.net

排 版 本刊编辑部

印 刷 济南继东彩艺印刷有限公司

国内发行 济南市邮政局

邮发代号 24-42

国外发行 中国国际图书贸易总公司

(北京 399 信箱 100044)

国外发行代号 4503 MO

中国标准连续出版物号

CN 37-1111/TQ

ISSN 1001-3539

鲁广发登字 3700005025 号

全国各地邮局均可订阅 每册定价 20 元

本刊杂志社办理订阅

本期责任编辑 代芳,吕召胜,杨超

著作权使用声明

本刊已许可知网、万方、维普、超星等以数字化方式复制、汇编、发行、信息网络传播本刊全文。本刊支付的稿酬已包含上述数据库著作权使用费,所有署名作者向本刊提交文章发表之行为视为同意上述声明。如有异议,请在投稿时说明,本刊将按作者说明处理。



**ENGINEERING
PLASTICS
APPLICATION
(EPA)**

Monthly

(Started Publication in 1973)

Vol.49, No10, 2021

(Series No.384)

Published on Oct. 10, 2021

Superintended by

China North Industries Group Corporation Limited

Sponsored by

CNGC Institute 53, etc.

Editor & Publisher

The Magazine House of

ENGINEERING PLASTICS APPLICATION

Director & Chief Editor Wang Jinli

Executive Chief Editor Zhang Zhen

Address No.3 Tianzhuang East Road, Tianqiao
District, Jinan, China

Postcode 250031

Tel +86 531 85878057 85878224
85878220 85878223

Fax +86 531 85947355

E-mail epa@epa1973.com

Website www.epa1973.com
www.epa1973.net

Distributor Abroad

China International Book Trading Corporation
(P.O. Box 399, Beijing 100044, China)

Distributing Code Abroad 4503 MO

China Standard Serial Numbering

ISSN 1001-3539

CN 37-1111/TQ

Duty Editor **Dai Fang**
Lyu Zhaosheng
Yang Chao

Main Contents

Materials & Applications

- Mechanical and Antibacterial Properties of PC/Copper-Loaded Graphene Oxide Composites Liang Jiafeng, Guo Jianqiang, Li Yue, *et al.*(1)
- Robust Lubricant-Infused Slippery Medical Catheters Based on Layer-by-Layer Assembled Multilayers Cheng Jing, Chen Suyang, Sun Wenwen, *et al.*(6)
- Preparation and Properties of Phase Change Energy Storage Microcapsules based on PMMA Capsule Shells Modified by Organosilicon Wang Zhongli, Hu Xianhai, Wu Lili, *et al.*(12)
- Preparation and Properties of PLA/Phosphogypsum Whisker Composites Gao Jinling, Li Yuan, Chu Zezhong, *et al.*(17)
- Piezoresistive Properties of Bi-directionally Orientated PUF/CA Composite Zhai Tianliang, Li Jianghao, Wang Xingyi, *et al.*(24)
- Preparation and Properties of Polyvinyl Alcohol/Carrageenan Composite Fibers Han Xiao, Wang Ling, Zhai Hongjie, *et al.*(29)
- Preparation and Properties of Carboxyl Type Coordination Composite Elastomer Zhao Yaqing, Tian Guofeng, Wu Jia, *et al.*(34)
- Synthesis of Prepolymer of Polycarbonate through Melt Transesterification Process Wang Jin(39)
- PPE Modification LCP and Film Blowing of LCP Wang Xiongwei, Zhou Yubo, Chu Shaosheng, *et al.*(44)
- Preparation and Properties of Low Density Polyamide/PP Composites Xu Xianjun, Yang Shuo, Ye Shaoyong, *et al.*(50)

Process Technology

- Effect of Material Formulation on the Shrinkage Evolution of UV-curing Injection Molded Products Song Le, Li Minghao, Li Zhengdian, *et al.*(56)
- Fabrication Process of Silicon Carbide Reinforced Photosensitive Resin by Response Surface Method Zong Xuewen, Liu Liangjing, Ni Mingyou, *et al.*(61)
- Optimization of 3D Printing Process Parameters for PLA based on Orthogonal Experiment Zheng Ling, Deng Xin, Jiao Xiaolan, *et al.*(68)
- Thermal Composite Process of Medical Melt Blowing/Spunlace Nonwovens and Its Liquid Asymmetric Transport Performance Wang Guofeng, Sun Huanwei, Zhang Heng, *et al.*(73)
- Ultra-Thin Carbon Fiber Plain Fabric Composite the Autoclave Forming High Profile Precision Antenna Reflector Liu Mingchang, Li Jianwei, Sun Kun, *et al.*(81)
- Optimization and Test Verification of Injection Parameters of Large Flow Length Ratio for Rear Abrasion Strip Zhang Hualong, Zhang Erhong, Su Haiyang, *et al.*(88)

Machinery & Moulds

- Injection Mould Design of Rear View Mirror Frame for Commercial Vehicle Zhang Shiyang, Chen Rongchuan, Gao Guangyu, *et al.*(93)
- Design of Mould and Inspection Fixture of Worm Screw Mechanism for Perfume Bottle Cap Cai Yan, Xiong Jianwu, Tang Feng, *et al.*(98)

Analysis & Ageing

- Influence of Attapulgite and Wollastonite on the Friction and Wear Behavior of PTFE Wu Di, Zhao Fuyan, Li Guijin, *et al.*(102)
- Tensile Performance of PE-HD Vegetation Net and Single-layer Geonet Liu Luliang, Qiao Jiangang, Dou Yuanming(110)
- Mechanical Properties of Glass Fiber Reinforced UP Matrix Composite for Bus Air Conditioning Cover Liu Kuo, Wu Fengnan, Jia Zhixin, *et al.*(115)
- Comparative Analysis of General and Spinning POM Nai Guoxing, Zhang Caixia, Sun Yanan, *et al.*(120)

Fillers & Additives

- Synthesis of DOPO based Polyphosphamide and Its Flame Retardant Properties of PLA Huang Shaowen, Long Lijuan, Wang Yanwen, *et al.*(124)
- Structures and Properties of PBAT/PLA Composites with Chain Extender Zhao Haipeng, Hu Shunpeng, Xia Xuelian, *et al.*(131)
- Synthesis of Grafted Polymer Molecular Chain Graphite Oxide and Its Modified Carbon Fiber Cui Haifeng, Zhou Xiaodong(138)
- Application of Ultrafine Magnesium Hydroxide on the PVC Calendaring Film Peng Hesong, Wu Weibing, Qiu Wenfu, *et al.*(143)
- Preparation and Performance of Flame-Retardant Indoor Wood-Plastic Composite Materials Zhang Aili, Lin Mei(148)

Summary

- Research Progress of Fiber Reinforced Plastics in Highway Engineering Liu Shuyan, Cui Hongjun, Zhang Zhaoyang, *et al.*(153)
- Research Progress of Benzoxazine Resin in Flame Retardant Field Wang Guorong, Li Yu, Mei Zhiyuan, *et al.*(161)
- Research Progress on Properties and Applications of PAN-based Carbon Nanofiber Films Based on Electrospinning Technology Yu Qianqian, Chen Gang, Wang Qifen, *et al.*(166)