



## News & Highlights

- 133** The Next Energy Battle: Cheap Natural Gas versus Renewables  
Mitch Leslie
- 136** Electric Car Market Poised to Accelerate  
Chris Palmer
- 139** Records Broken for Optical Fiber Capacity and Distance  
Mitch Leslie

## Views & Comments

- 141** Engineering for Inclusion: Empowering Individuals with Physical and Neurological Differences through Engineering Invention, Research, and Development  
Peter T. Cummings et al.

## Research

### Tissue Engineering—Review

- 144** Current Developments in the Stable Production of Human Induced Pluripotent Stem Cells  
Ikki Horiguchi et al.

### Tissue Engineering—Article

- 153** Enhancing the Surface Properties of a Bioengineered Anterior Cruciate Ligament Matrix for Use with Point-of-Care Stem Cell Therapy  
Xiaohua Yu et al.

### Clinical Engineering—Article

- 162** Disease Risk Comorbidity Index for Patients Receiving Haploidentical Allogeneic Hematopoietic Transplantation  
Xiao-Dong Mo et al.
- 170** Hospital-Based Phenotypic Features and Treatment Outcomes of Chinese Women with Polycystic Ovary Syndrome: The Effect of Body Mass Index and Geographic Distribution  
Jingshu Gao et al.

### Hydraulic Engineering—Article

- 178** Inducing Flow Velocities to Manage Fish Reproduction in Regulated Rivers  
Qiuwen Chen et al.
- 187** Suitable Weir Heights to Improve the Provision of Environmental Flows in Urban Rivers  
Yuanyuan Sun et al.

### Environmental Engineering—Article

- 195** Development of a Novel Feedforward Neural Network Model Based on Controllable Parameters for Predicting Effluent Total Nitrogen  
Zihao Zhao et al.

- 203** Thermal Hydrolysis of Wastewater Sludge Followed by Fungal Fermentation for Organic Recovery and Hyphae Fiber Production  
Jia-jin Liang et al.

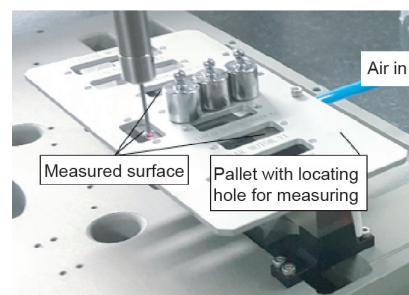
### Food Safety and Health—Review

- 212** Influence of Probiotic Fermented Fruit and Vegetables on Human Health and the Related Industrial Development Trend  
Qianqian Guan et al.

- 219** Physicochemical Properties and Bioactivities of Rice Beans Fermented by *Bacillus amyloliquefaciens*  
Shan Wu et al.

### Precision Engineering—Article

- 226** Design of Microstructure Parameters on a Small Multi-Throttle Aerostatic Guideway in Photolithography  
Zhongpu Wen et al.

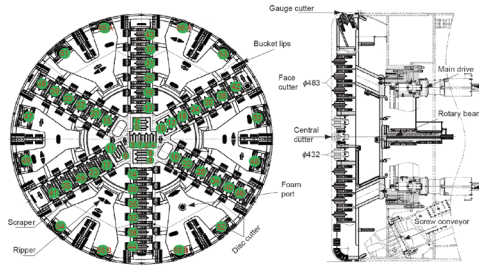


Page 235

# Contents

## Tunnel Engineering—Article

- 238** Prediction of Disc Cutter Life During Shield Tunneling with AI via the Incorporation of a Genetic Algorithm into a GMDH-Type Neural Network  
Khalid Elbaz et al.



Page 244

## Geodesy and Survey Engineering—Article

- 252** A Survey of Sediment Fineness and Moisture Content  
in the Soyang Lake Floodplain Using GPS Data  
Mutiaru Syifa et al.

## Engineering Management—Article

- 260** Synergic Effect of Reworking for Imperfect Quality Items with the Integration of Multi-Period Delay-in-Payment and Partial Backordering in Global Supply Chains  
Waqas Ahmed et al.



## ON THE COVER

Wastewater sludge has become a major environmental and social problem for many cities. Biorefinery technology converts waste sludge into fibrous materials, such as the hyphae fibers shown in this image, through thermal hydrolysis followed by fungal fermentation. Waste organics in the sludge are released into the liquid phase by means of thermal hydrolysis, and the dissolved organics are further synthesized into valuable hyphae fibers through fermentation by the filamentous fungus *Aspergillus niger*. Hyphae fibers are then self-assembled to form mycelium pellets that can be readily recovered. As high-quality fibrous materials, hyphae fibers can be used for making paper sheets and as packing and filling materials. These biofibers can also be utilized as an ideal carbon source to produce heteroatom-doped carbon materials for applications in batteries, supercapacitors, fuel cells, and hydrogen storage. Thus, biorefinery technology holds attractive potential for the bioconversion of a wide range of organic wastes via fungal fermentation into valuable biomass-based materials such as hyphae fibers.

## News & Highlights

- 145 下一场能源之战——廉价天然气与可再生能源  
Mitch Leslie
- 148 电动汽车市场加速发展  
Chris Palmer
- 151 光纤容量和传输距离打破纪录  
Mitch Leslie

## Views & Comments

- 154 包容性工程——借助工程技术发明为身体或精神障碍人士赋能  
Peter T. Cummings et al.

## Research

- Tissue Engineering—Review**  
158 人类诱导性多能干细胞稳定生产的最新进展  
Ikki Horiguchi et al.
- Tissue Engineering—Article**  
168 增强生物工程化的前交叉韧带基质的表面特性用于即时干细胞治疗  
Xiaohua Yu et al.
- Clinical Engineering—Article**  
178 疾病危险度 - 共患病指数在单倍型造血干细胞移植中的应用  
莫晓冬 等
- 187 基于就医人群的中国多囊卵巢综合征女性的临床表型和治疗结局——身体质量指数与地理分布的影响  
高敬书 等

## Hydraulic Engineering—Article

- 198 建坝河流鱼类繁殖的流速调控  
陈求稳 等
- 207 面向城市河流生态流量保障的堰高确定方法  
孙媛媛 等

## Environmental Engineering—Article

- 215 基于可控参数的前馈神经网络出水总氮预测模型研究  
赵子豪 等

- 223 市政污泥热水解—真菌发酵产菌丝纤维回收有机质资源的研究  
梁嘉晋 等

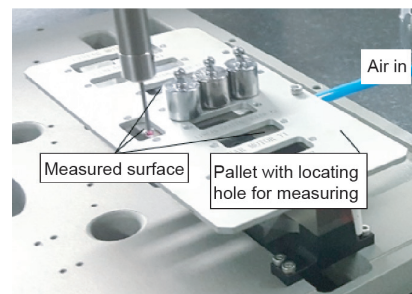
## Food Safety and Health—Review

- 233 益生菌发酵果蔬对人体健康的影响及其产业化发展趋势  
关倩倩 等

- 241 解淀粉芽孢杆菌发酵红小豆的理化特性和生物活性  
吴珊 等

## Precision Engineering—Article

- 249 光刻机小型复合节流静压气浮导轨微结构参数设计  
温众普 等



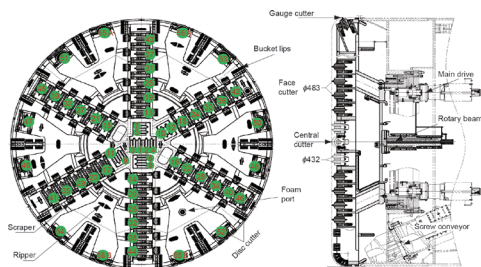
Page 260



# Contents

## Tunnel Engineering—Article

- 263 遗传算法与分组数据处理神经网络相结合的人工  
智能预测盾构掘进过程中滚刀的寿命  
Khalid Elbaz et al.



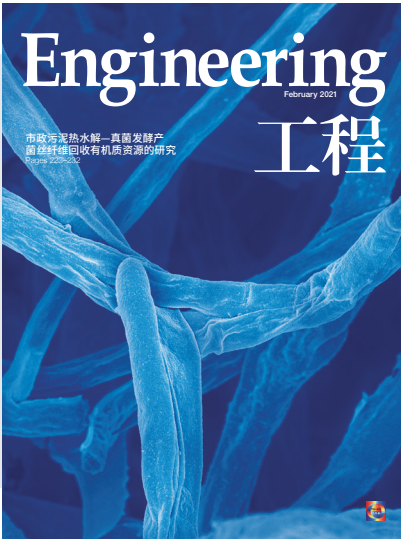
Page 269

## Geodesy and Survey Engineering—Article

- 278 利用 GPS 数据资料调查昭阳湖洪滩区沉积物的细  
度和含水量  
Mutia Syifa et al.

## Engineering Management—Article

- 287 全球供应链中残次品返工与多期延迟付款和部分  
延迟订购整合的协同效应  
Waqas Ahmed et al.



### 封面说明

市政污泥已成为许多城市面临的重大环境和社会问题。生物精炼技术通过热水解和真菌发酵可以将市政污泥转化为纤维材料，如封面图中所示的菌丝纤维。市政污泥中的有机物通过热水解被释放到液相中，溶解的有机物经过黑曲霉 (*Aspergillus niger*) 真菌发酵，进一步合成具有高附加值的菌丝纤维。菌丝纤维经过自组装，形成易于回收的菌丝球。菌丝纤维是一种优质的纤维材料，可用于制备纸基材料、包装和填充材料。这些菌丝纤维还可以作为理想的前驱体用于制备杂原子掺杂的碳基材料，可用作电池、超级电容器、燃料电池和氢存储材料。因此，生物精炼技术在通过真菌发酵将有机废物转化为高增值的生物基材料（如菌丝纤维）方面具有诱人的潜力。