

## 光纤布拉格光栅传感技术在隧道火灾监测中的应用研究

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摘要:

针对公路隧道存在潜在的火灾问题, 提出一种利用环氧树脂封装而成的光纤布拉格光栅传感器对隧道火灾进行监测, 分析了其基本原理及温度传感特性, 实验结果表明封装后的光纤光栅的温度传感灵敏度约是裸光栅的2.75倍。再利用光纤光栅多区波分复用技术, 设计了一套基于光纤布拉格光栅传感技术的隧道火灾报警监测系统。结合现场模拟监测实验, 证明该系统灵敏度高、数据准确, 能够对隧道火灾报警方位进行精确判断, 为隧道火灾的预警和救灾赢得时间。

关键词: 光纤布拉格光栅; 光纤传感; 多区波分复用; 隧道火灾监测系统

## Application and research of optical fiber Bragg grating sensing technology in the tunnel fire monitoring

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**Abstract:**

According to the highway tunnel existing potential fire problem, this paper puts forward a fiber Bragg grating sensor that was packaged by use of the epoxy resin encapsulation to monitor the tunnel fire, the basic principles and temperature sensing characteristics of fiber Bragg grating sensors were analyzed. The experimental results shows that encapsulated fiber grating temperature sensor sensitivity is about 2.75 times than the bare grating. The tunnel fire alarm monitoring system based on Multi-zone WDM technology with fiber Bragg grating sensor technology was present. And combined with field analog monitoring experiment, it proved the system had high sensitivity and required data. Further, it can judge the tunnel fire alarm position accurately, to gain time for the tunnel fire disaster prevention and relief.

**Keywords:** fiber Bragg grating sensor; optical fiber sensing; Multi-zone WDM; tunnel fire monitoring system

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