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无胶化封装的光纤Bragg光栅高温应变传感器及其特性研究

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摘　要：

本文提出了一种全新的具有极好温度自校正能力的光纤Bragg光栅高温应变传感器结构，并提供一种新的封装方式能够实现在250°C高温环境下应变的高精度测量并且具有极好的稳定性和重复性，可应用于250°C左右的环境下大型机械等接触式高精度应变测量，另外该结构简单能够实现量产，对高温环境下的工程应用具有很好的实用价值。我们通过实验获得传感器在250°C左右的应变测量灵敏度约为372.6pm/N，线性度为R2=0.9992。

关键词：光纤布拉格光栅；高温应变；无胶化封装;温度和应变的交叉敏感.

Non-gel encapsulation process of a high temperature strain fiber Bragg grating sensor and its sensing properties

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Abstract:

A novel fiber Bragg grating (FBG) high-temperature strain sensor with an effective temperature compensation structure is proposed and demonstrated in this paper. A new approach for encapsulation of FBG with high-temperature strain sensing structure is presented, which can realize the high-precision measurement of the strain which is achieved around 250℃. The experimental results show that the proposed non-gel encapsulation method of FBG with high-temperature strain sensing structure has excellet stability and repeatability. It is applicable to measure the contact-type and high-precision strain of large machinery in about 250℃ environment and furthermore, this structure is simple and thus it is able to achieve mass production. Therefore, it has excellect practical value for the engineering application in high-temperature environment. The strain sensitivity obtained in our experiment is about 369.4pm / N, while the linearity is R2 = 0.9992.

Keywords: fiber Bragg gratings (FBG); high temperature strain sensor; no gel encapsulation;cross sensitivity of temperature and strain.

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