传感技术学报
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一种新颖的布拉格光栅气体压力传感器的设计与实验

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摘　要：

摘要 设计了一种将光纤光栅悬空固定结构的气体压力传感器，利用金属不锈钢菱形结构将波纹管中的压强转化成该菱形结构的应变，同时实现将菱形纵向分布的压力转化成菱形横向的应变，通过菱形结构应变直接被传递给光纤光栅，从而实现了测量波纹管内压强的目的。实验结果表明，在0-0.45Mpa范围内,光纤光栅中心波长的漂移与波纹管中的压强呈很好的线性关系，线性度可达0.99以上. 在压力测量范围内,压力灵敏度系数达到1.360 ×10-3MPa（相当于灵敏度2.111nm/ MPa）.

关键词：关键词：光纤光学；气体压力传感器；光纤布拉格光栅； 菱形结构；波纹管

Design and Experiment of novel Fiber Bragg Grating Pressure Gas Sensor

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Abstract:

Abstract: A novel optical fiber Bragg grating (FBG) pressure gas sensor with simple structure is proposed. While pressure of bellows is transformed to Lozenge structure, Vertical distribution of pressure is transformed to horizontal strain of the Lozenge structure, and is transmitted to FBG which is pasted on the Lozenge structure. By monitoring the central wavelength shift difference of the FBG, the vertical distribution of pressure can be obtained. It has proved that the variety of pressure can be sensed by the sensor. Preliminary experiments were carried out and the feasibility of this proposed sensor is verified. The experimental results indicate that the pressure measurement sensitivity coefficient can reach 1.360×10-3/MPa(equivalently, sensitivity can reach 2.111nm/ MPa), while the correlation coefficient is 0.994.

Keywords: Key words: Fiber optics; Pressure Gas Sensor; Fiber Bragg Grating; Lozenge structure; bellows

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