

论文

合金膜光纤腐蚀传感器传感规律研究

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摘要:

利用PVD溅射镀以及PVD与电镀复合两种方法在光纤纤芯上制备了不同厚度的Fe-C合金膜, 对其进行X-射线衍射分析, 所制膜层晶体结构类型与普通碳钢基本一致. 通过将镀膜光纤放入不同浓度的HNO3溶液中以及埋入混凝土结构中, 进行了腐蚀实验. 结果表明: 在低浓度的腐蚀溶液中, 不同厚度的Fe-C合金膜会从外到内被均匀地腐蚀掉, 输出光功率会在腐蚀末期有一个急剧的增大现象|在高浓度的腐蚀溶液中, Fe-C合金膜会在各个局部产生裂纹, 膜层被一块一块地腐蚀掉|输出光功率整体趋势增大, 但并没有特别急剧的增大现象|混凝土试块中的腐蚀实验中, 输出光功率的变化复杂多变, 但整体趋势还是一个增大的过程.

关键词: 光纤腐蚀传感器 Fe-C合金膜制备 腐蚀实验 传感规律

The Sensing Law of Optical Fiber Corrosion Sensor with Fe-C Alloy Film

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Abstract:

By the two methods that PVD sputtering and PVD sputtering associated with electroplating, the different thickness Fe-C alloy films on fiber core were made. X-ray diffraction results show that the Fe-C alloy films have the same crystal structure as ordinary steel. In order to carry on the corrosion experiments, putting the galvanized fiber into different concentration HNO3 solutions and concrete block respectively. The results show that: In low concentration etching solution, the different thickness Fe-C alloy films can be eroded from outside to inside evenly, and the output optical power increases suddenly in the corrosion last stage. In highly concentrated etching solution, the Fe-C alloy films produce the crack in many parts, the films are perished piece by piece, and the output optical power increases gradually in the mass. In the corrosion experiment which was made in a concrete block, the change of the output optical power is complicated, but in the whole it is increased.

Keywords: Optical fiber corrosion sensor Fabrication of Fe-C alloy film Corrosion test

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