

基于水下原位金属元素检测的微气柱辅助 LIBS 信号增强方法研究

Study on the method of micro-gas column
assisted LIBS signal enhancement based on
underwater in-situ metal element detection

摘 要

激光诱导击穿光谱 (Laser induced breakdown spectroscopy, LIBS) 技术可以用于海洋环境检测领域的研究。本论文使用 1064nm 的 YAG 激光器对有无微气柱辅助的水体样品中不同微量元素释放的信号强度进行研究,其目的是确定通过微气柱可以增强等离子体的辐射的稳定性从而提高检测灵敏度,并检测水体中的元素含量。本论文研究的目的是探讨利用 LIBS 对水体环境进行检测从而达到在海洋中进行原位探测的目的。在这项工作中,我们首先搭建微气柱辅助装置,通过对比有无微气柱辅助的检测装置得到的光谱强度、击穿效果、等离子状态等证明有微气柱辅助可以提高 LIBS 检测技术的检测限,并通过分析光谱数据判断水体样品的元素含量。

关键词 激光诱导击穿 微气柱 海洋 微量元素

Abstract

Laser induced breakdown spectroscopy (LIBS) can be used to study the ocean environment. In this paper, 1064nm YAG laser was used to study the signal strength of different trace elements released from water samples with the aid of micro-gas column. The purpose is to determine that the stability of plasma radiation can be enhanced by micro-gas column so as to improve the detection sensitivity, and the content of elements in water. The purpose of this paper is to explore the use of LIBS to detect the water environment so as to achieve the purpose of in-situ detection in the ocean. In this work, we first built the micro-gas column auxiliary device. By

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