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发光学应用及交叉前沿

基于光纤的溶解氧浓度荧光测定法

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摘要：针对溶解氧浓度微量探测的现实需求，提出了一种基于荧光猝灭原理、利用多孔光纤实现的溶解氧浓度测定新方法。该方法将钌联吡啶[Ru(dpp)₃]Cl₂掺杂的凝胶薄膜修饰在多孔光纤的内壁上，制备了一种溶解氧测定探头并对其测试性能进行表征。光纤贯穿整个长度的孔洞结构既可以作为敏感膜的载体，也可以作为待测物流过的通道和反应场所。与传统测试方法相比，该测试探头的多孔道结构显著提高了比表面积，指示剂可以与溶解氧直接反应，提高了探头的敏感性并且具有微量探测的潜力。实验结果表明，在0~20 mg/L的浓度范围内，Stern-Volmer曲线近似线性，响应敏感度 I_0/I 为3.6，响应时间为200 ms。该测试方法在溶解氧微量探测领域具有重要用途。

关键词：多孔光纤 光学传感 溶解氧 溶胶-凝胶

Fluorescence Detection Method of Dissolved Oxygen Based on Fiber

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Abstract: The paper proposed a new determination method to meet practical needs of trace detection of dissolved oxygen (DO), which is based on fluorescence quenching and using holy optical fiber (HOF). A DO optical probe was fabricated by modifying the sensitive film doped with fluorophore in the array microholes of HOF, and the sensing character was characterized. The microholes throughout the whole fiber could be used as the substrate of sensing materials and minor reaction pools. Compared with the conventional DO probe, the arrays microholes had huge sensing surfaces and the fluorophore can interact directly with the oxygen molecules, so the sensitivity was improved and also has the potential application in microanalysis detection. From the experimental results, we find the Stern-Volmer plots are linear in the full concentration range of 0~20 mg/L. The ratio of I_0/I as a sensitivity of the probe is 3.6, and the probe can make a quick response within 200 ms. The probe has important applications in the dissolved oxygen trace detection.

Keywords: holy optical fiber optical sensing dissolved oxygen sol-gel

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