

用热聚法固定指示剂的光纤氧气传感器研究

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摘要 采用热聚法将甲叉双丙烯酰胺 (MBBA) 聚合并共价交联在硅烷化的玻璃微珠上, 同时将指示剂 Ru(II)-邻啡咯啉配合物物理包埋于聚合物中, 研制了一种基于 荧光猝灭原理的光纤氧气传感器, 采用 NaHSO₃-O₂-MnSO₄ 体系引发 MBBA 水溶液热 聚合后应, 通过确定 NaHSO₃, MnSO₄, MBBA 和 Ru(phen)₃Cl₂ 的最佳反应浓度以及 玻璃微珠的尺寸, 优化了聚合反应条件, 改善了指示剂的固定效果, 制备了性能较 好的传感器探头, 该传感器的检测下限为 5×10⁻⁶(V/V), 响应时间为 10s 该传感器连续工作 50min, 重复性标准偏差为 ±1%。

关键词 [传感器](#) [氧](#) [荧光猝灭剂](#) [交联](#) [光学纤维](#) [丙烯酰胺 P](#) [二氮杂菲](#) [钌络合物](#)

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Study on New Fiber Optic Oxygen Sensor with Immobilizing the Indicator by Thermo-polymerization Method

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Abstract A new fiber optic oxygen sensor based on the fluorescence quenching of Ru(phen)₃Cl₂ has been fabricated by thermo-polymerization method. The ruthenium dye is immobilized in N,V-methylene bisacrylamide (MBBA) polymer by physically trapping while MBBA is covalently cross-linked on the glass micro-pearls by NaHSO₃-O₂-MnSO₄ initiator system. The immobilization stability of ruthenium dye and performance of the sensor are improved by the new polymerization system. The polymerization reactivity is enhanced by optimizing the concentration of NaHSO₃, MnSO₄, MBBA, Ru(phen)₃Cl₂ and the best diameter of the glass micro-pearls. An absolute detection limit of 5* 10⁻⁶ (V/V) and the response time of 10 s can be achieved. The sensor is fully reversible and highly reproducible. The standard deviation of around ± 1 % within 50 min consecutive measurements has been observed for various oxygen concentrations.

Key words [SENSORS](#) [OXYGEN](#) [FLUORESCENCE QUENCHER](#) [CROSSLINKING](#) [OPTICAL FIBER](#) [PROPENAMIDE P](#) [PHENANTHROLINE](#) [RUTHENIUM COMPLEX](#)

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