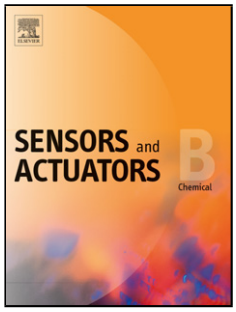

Title: Robust and magnetically recoverable dual-sensor particles: real-time monitoring of glucose and dissolved oxygen

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Abstract: In this work, we presented the robust and magnetically recoverable dual sensor particles that are capable of real-time monitoring of dissolved oxygen (DO) and glucose concentrations in aqueous solutions. The dual sensor consists of glucose oxidase-functionalized polyethylenimine-coated Fe3O4 particles (Fe3O4@PEI-GOD) and sub-micro-sized Fe3O4-modified poly(Platinum porphyrin-co-Styrene) ((PtTFPPMA-PS)@Fe3O4) fluorescent spheres. The dual sensing functions originate from the cascade catalysis amplification driven by the recyclable Fe3O4@PEI-GOD particles and glucose oxidase consumption of oxygen in the process of glucose oxidation. Consequently, the (PtTFPPMA-PS)@Fe3O4 fluorescent spheres exhibited higher fluorescence intensity due to the effective alleviation of fluorescence quenching effect raised from the decrease of DO. The remarkable fluorescence intensity-changing characteristics of the solutions facilitate convenient identification of oxygen concentrations and glucose concentrations even with naked eyes. Thanks to the magnetically recoverable superiority, the recycle study proved that the multifunctional particles could be repeatedly utilized without significant catalytic activity loss after 10 cycles. Interestingly, the sensing film comprising the (PtTFPPMA-PS)@Fe3O4 fluorescent spheres can also be applied to the unsteady pressure measurement and unsteady air flow visualization due to its remarkable light intensity-changing features.