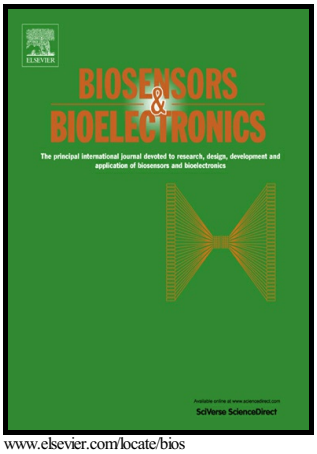

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Facile synthesis of a ratiometric oxygen nanosensor for cellular imaging

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Abstract

A new type of cell-penetrating ratiometric fluorescence oxygen sensing nanoparticle was prepared through a facile co-precipitation method. Amphiphilic polymer poly (styrene-co-maleic anhydride) (PSMA) was firstly cooperated with polystyrene (PS) to envelop the highly photostable phosphorescent oxygen indicator, platinum(II)-tetrakis(pentafluorophenyl)porphyrin (PtTFPP, emission at 648 nm), and the reference fluorophore, poly(9, 9-dioctylfluorene) (PFO, emission at 440 nm), via hydrophobic interaction in aqueous solution. To improve the sensor biocompatibility, the biomacromolecule poly-L-lysine (PLL) was selected to act as a shell via electrostatic forces. The as-prepared PtTFPP doped core-shell nanoparticles (called PPMA/PLL NPs) exhibited an excellent ratiometric luminescence response to O_2 content with high quenching efficiency and full reversibility in the oxygen sensing. More importantly, these oxygen nanosensors passed across the cell membrane after co-incubation without external force. Labeled cells exhibited high brightness in the matching blue and red channels of a digital camera. And most nanosensors were found locating in cytoplasm rather than being trapped in endosomes.

Keywords: Ratiometric oxygen nanosensor; Poly (styrene-co-maleic anhydride) (PSMA); Poly-L-lysine (PLL); Co-precipitation; Cellular imaging.