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FLUORESCENT SENSORY CORE-SHELL PARTICLES FOR SELECTIVE DETECTION OF SPHINGOSINE 1-PHOSPHATE AND PHOSPHATIDIC ACID

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Sphingosine 1-Phosphate (S1P) is a bioactive sphingolipid with broad range of activities coupled to its role in G-protein coupled receptor signaling [1]. Monitoring of both intra and extra cellular levels of this lipid is challenging due to its low abundance and lack of robust affinity assays or sensors. We here report on fluorescent sensory core-shell molecularly imprinted polymer (MIP) particles responsive to near physiologically relevant levels of S1P and the S1P receptor agonist Fingolimod Phosphate [2] (FP) in spiked serum samples. Imprinting was achieved using FP(TBA) or Phosphatidic Acid (DPPA(Na)) as templates in combination with a polymerizable nitrobenzoxadiazole (NBD)-urea monomer with the dual role of capturing the phospho-anion and signalling its presence. The monomers were grafted from ca 300 nm RAFT-modified silica core particles using ethyleneglycol dimethacrylate (EGDMA) as crosslinker resulting in 10-20 nm thick shells displaying selective fluorescence response to the targeted lipids S1P and DPPA in aqueous buffered media. Potential use of the sensory particles for monitoring S1P in serum was demonstrated on spiked serum samples, proving a linear range of 8-60 μM and a detection limit of 5.6 μM, a value slightly exceeding the plasma concentration of the biomarker.

References

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