

Exploring indicator displacement assays for phosphate detection in seawater

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Indicator displacement assays are based on the optical signal modulation of a noncovalently bound indicator upon dissociation by an analyte species. Our work has focused on exploring the lower detection limits for fluorescence displacement assays for inorganic phosphate in seawater using complex ions containing two di(2-picoyl)amine ligands (also called DPA or bis(2-pyridylmethyl)amine), each coordinating a zinc cation. We have been exploring the use of the well-established $[\text{Zn}_2(\text{H-bpmp})]^{3+}$ ligand system with two fluorescent dyes that absorb and emit visible wavelengths; salicyl fluorone (SF) and a dihydroxy bodippy dye (Dh-BD, or 10-(3,4-dihydroxyphenyl)-5,5-difluoro-1,3,7,9-tetramethyl-5H-dipyrrolo[1,2-c:2',1'-f][1,3,2]diazaborinin-4-ium-5-uide). To date, our limits of detection for a simple fluorescence assay with their dyes is on the order of a single ppm's for SF and single ppb's for DH-BD both in the presence of 0.1 M NaCl.