

Towards the Development of a Low-Cost and Easily-Deployable Sensing Platform for Phosphate and Nitrate

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We will present results from our initial experiments leading to the development of a low-cost and easily-deployable sensing platform for phosphate and nitrate. The phosphate sensor is based on carboxylic acid functionalized carbon nanodots complexed with europium (III) ions.¹ Upon excitation at 370 nm, the native carbon nanodot fluorescence at 500 nm and quenched by the complexation with the europium (II) ions is restored upon interaction with phosphate (H_2PO_4^- or HPO_4^{2-}). The nitrate sensor is based on a potential sensitive dye, diA [4-(4-dihexadecylaminostyryl)-N-methylpyridinium iodide], incorporated with a nitrate ionophore and a plasticizer in a PVC membrane.²

The diffusion of nitrate into the membrane results in changes in the local environment of the dye and an increase in fluorescence at 560 nm ($\lambda_{\text{ex}} = 460$ nm). At present, our LOD's for both phosphate and nitrate are 10^{-5} M (≈ 1 ppm) and we are working to (i) improve sensitivity, (ii) alter the chemical composition to realize a common excitation wavelength, and (iii) fabricate paper-based devices.

¹H X. Zhao, L. Q. Liu, Z. D. Liu, Y. Wang, X. J. Zhao, and C. Z. Huang. *Chem Comm.* 47, 2604-2606, 2011.

²G. Kim, K. A. Sudduth, S. A. Grant and N. R. Kitchen. *J. Biosystems Eng*, 37, 209-213, 2012.