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# ISIDORE probe for trace metal speciation: from equilibrium to dynamic approach

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Up to now, different approaches have been proposed for in situ trace metal speciation, based on the deployment of in situ devices such as Donnan Membrane device (DMT) and then analysis by ICP-MS [1], or by means of preconcentration systems hyphenated with electrochemical detection such as gel integrated microelectrode (GIME) probe [2] or a direct in situ electrochemical stripping speciation method such as Absence Gradient Nernstian Equilibrium Stripping (AGNES) [3]. Although numerous in situ methods have been proposed, currently there is no reliable *in situ* probe for trace metal speciation at concentration levels present in natural systems. Regarding autonomy problems of *in situ* probes, electrochemical devices have the advantage of being easily available in smaller sizes and with the possibility to be operated with batteries.

This work presents the probe ISIDORE developed for in situ trace metal speciation [4]. This probe is based on the hyphenation between a DMT and a screen-printed electrode through a flow-cell (Figure 1), allowing a direct in situ detection and avoiding thus all problems inherent to sampling, transport and storage. The acceptor solution of the DMT was first optimized for electrochemical detection with a composition of 3 mmol L<sup>-1</sup> Ca(NO<sub>3</sub>)<sub>2</sub> and 3 mmol L<sup>-1</sup> of sodium acetate buffer at pH 4.5. Under these conditions, the simultaneous determination of Zn, Pb and Cd is possible at low detection limits. The lower volume of the acceptor solution yielded a much faster equilibrium time, 6 h, as compared with the common 36 to 48 h deployment needed to reach equilibrium. The possibility of using the accumulation slope with ISIDORE is studied to further reduce the analysis time and obtain dynamic information on the nature of the metal complexes [5].

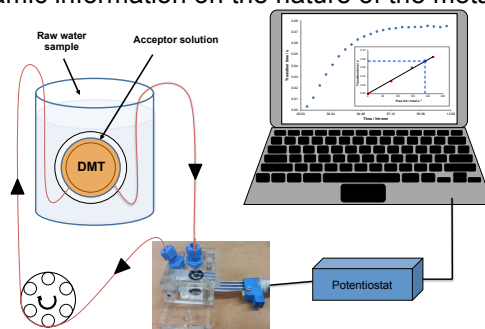


Figure 1: ISIDORE Probe scheme

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