**An innovative approach based on polymer inclusion membranes for the assessment of Zn bioavailability**

Ruben Vera1, Gemma Mostazo1, Olga serra2. Clàudia Fontàs1, Enriqueta Anticó1

1Dept of Chemistry. Unversity of Girona, Campus Montilivi 17071 Girona, Spain, enriqueta.antico@udg.edu

2Dept of Chemistry. Unversity of Biology, Campus Montilivi 17071 Girona, Spain

Zinc is an essential element for plant nutrition. In natural waters, zinc exists in different chemical forms such as free hydrated ion, inorganic and organic complexes. The bioavailability of trace elements in the soil solution depends on their chemical speciation. Lipophilicity, global charge and lability of the complexes are the main factors that determine metal uptake by organisms and therefore information about speciation is crucial. For that, it is necessary to develop analytical techniques able to measure not the total metal in solution but the free or labile fraction. Ion selective electrodes, AGNES (absence of gradients and Nerstian equilibrium stripping), DMT (Donnan membrane technique), DGT (diffusive gradients in thin films) and PLM (permeation liquid membranes) have been used for this purpose. Here, we present an innovative approach based on polymer inclusion membranes (PIMs). PIMs basically consist of: i) a base polymer (usually cellulose triacetate (CTA) or polyvinyl chloride (PVC)), which provides mechanical strength to the membrane, ii) a carrier (or extractant) to facilitate the selective transport for specific chemical species, and iii) a plasticizer to favour both the increase of the solubility of the extracted species in the membrane and its elasticity. PIMs have been applied for the transport of inorganic as well as organic species and its application as passive samplers has been recently outlined [1,2]. For zinc bioavailability studies we have prepared a PIM containing PVC as polymer and D2EHPA (di-2-ethylhexyl phosphoric) as extractant. The source solution consisted of a hydroponic media, where zinc and different ligands (humic acid, EDTA) were added. We have evaluated the influence of different parameters on zinc accumulation, i.e. membrane composition, pH, and concentration of HNO3 in the receiving phase. Moreover, zinc accumulation in the roots and shoots of *Solanum tuberosum* plants has also been measured and the experimental data has shown good agreement with the results obtained with PIMs.

References:

[1] R. Güell, E. Anticó, S.D. Kolev, J. Benavente, V. Salvadó, C. Fontàs. Journal of Membrane Science 383 (2011) 88-95.

[2] M.I. G.S. Almeida, C. Chan, V.J. Pettigrove, R.W. Cattrall, S.D. Kolev. Enrironmental Pollution 193 (2014) 233-239.

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