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Purely inorganic nanomaterials: new opportunities of boron clusters in medicine

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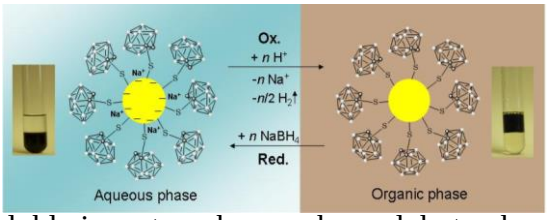
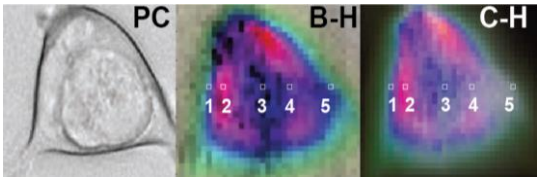
ABSTRACT



Relative to carbon, very little is currently known about boron in therapeutics. The aim of this presentation is to show the ability of boron clusters in producing new molecules for their desired application in nanomaterials and nanomedicine. In this regard, a new type of gold NPs, which is hydrophobic and completely insoluble in water when uncharged, but, when offered electrons by a suitable reducing agent, transfers readily to an aqueous.[1] The design of water-soluble boron rich particles or macromolecules is of significance for medicine and for drug delivery.



In addition, [3,3'-Co(1,2-$C_2B_9H_{11})_2$]$^-$ has also been shown to form small monolayer nano-vesicles and micelles in water depending on the concentration[2] while, [3,3'-Co(8-I-1,2-$C_2B_9H_{10})_2$]$^-$ has been found to self-assemble into a lyotropic lamellar phase.[3] Both boron--rich metallacarboranes have shown to cross through synthetic lipid membranes and to accumulate within living cells, where they can be detected by νB-H Raman Microspectroscopy.[4]

We investigated the interaction of this inorganic membrane system with living cells.[5] [3,3'-Co(1,2-$C_2B_9H_{11})_2$]$^-$ elicits a range of cell biological effects, including altered cell morphology, inhibition of cell growth and in some cases apoptosis. These results reveal unexpected properties at the interface of biological and synthetic membranes[6] and demonstrate an alternative method for cell labelling and detection.

References: [1]A. M. Cioran, A. D. Musteti, F. Teixidor, Z. Krpetic, I. A. Prior, Q. He, C. J. Kiely, M. Brust and C. Viñas, *J. Am. Chem.Soc.* 2012, 134, 212. [2]P. Bauduin, S. Prevost, P. Farràs, F. Teixidor, O. Diat, T. Zemb, *Angew Chem Int Ed Engl.* 2011, 50, 5298. [3]D. Brusselle, P. Bauduin, L. Girard, A. Zaulet, C. Viñas, F. Teixidor, I. Ly, O. Diat, *Angew. Chem. Int. Ed.* 2013, 52, 12114. [4]M. Tarrés, E. Canetta, C. Viñas, F. Teixidor, A.J. Harwood, *Chem. Commun*, 2014, 50, 3370. [5]M. Tarrés, E. Canetta, E. Paul, J. Forbes, K. Azzouni, C. Viñas, F. Teixidor and A. J. Harwood, SCIENTIFIC REPORTS | 5 : 7804 | DOI: 10.1038/srep07804. [6]C. Verdiá-Báguena, A. Alcaraz, V. M. Aguilella, A.M. Cioran, S. Tachikawa, H. Nakamura, F. Teixidor, C. Viñas, *Chem. Commun*, 2014, 50, 6700.

29th April 2016, 11h30

C1 Building, Floor 3, Room 1.3.20