第302回触媒化学研究センターコロキウム

Building large molecules from iodinated *o*-carborane aiming for medical applications

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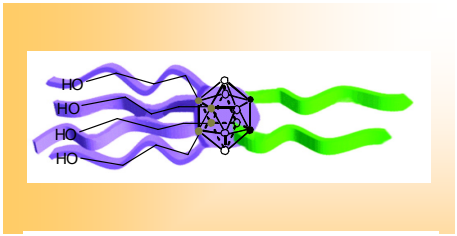
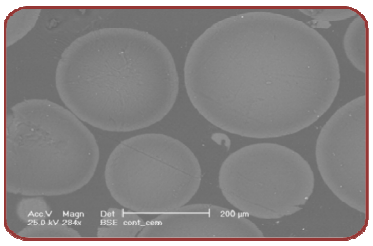
November 10, 2011 (Thu) 14:00-15:00
Seminar Room A, Sousei Hall, Hokkaido University
（北海道大学創成科学研究棟4階セミナー室A）
http://www.cat.hokudai.ac.jp/access.html

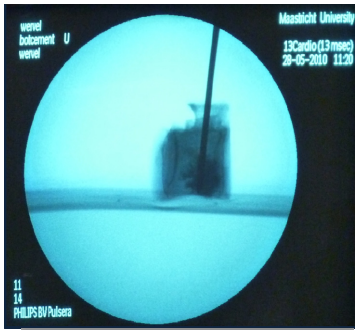
The aim of this presentation is to show the ability of boron cluster chemistry in producing new molecules, large molecule and dendrons for their desired application in medicine and biomaterials. For these purposes new methods of functionalizing the boron clusters are needed. These shall facilitate the synthesis of molecules with high boron content, of relevance in medicine and neutron sensing, or the grafting of the boron clusters on surfaces of different nature.

1) Carboranes are molecules with unique structural features due to their rigid geometry and rich derivative chemistry, which make them of great interest as building blocks for macromolecular or supramolecular entities. *o*-Carborane derivatives with precisely defined patterns of substitution have been prepared from 8,9,10,12-I_4-1,2-*closo*-$C_2B_{10}H_8$ [1] by replacing the iodine atoms, bonded to four adjacent boron vertices in the cluster, with allyl, and subsequently 3-hydroxypropyl groups [2]. The resulting structures, comprising four pendant arms in a compact region and two reactive vertices located on opposite sides of a central *o*-carborane core can be envisaged as versatile precursors for dendritic growth. The formation of high content and highly dense boron compounds shall be relevant in facets as diverse as Boron Neutron Capture Therapy, Drug Delivery or Neutron sensing.



2) We have considered the view of these clusters as real tridimensional building blocks for the development and the preparation of new biopolymers. We will introduce a new highly-radiopaque bone cement for vertebroplasty in which the contrast is realized through the incorporation of tetraiodocarborane, 8,9,10,12-I_4-1,2-*closo*-$C_2B_8H_{10}$, as an attractive X-ray contrast additive into a methacrylic copolymer [3]. The new cement provides three significant advantages: (i) controlled viscosity in the dough phase, which facilitates precise injection during the vertebroplasty procedure; (ii) excellent structural stability, which precludes leaching of contrast post-implantation and iii) the cement's biocompatibility.





[1] A. Vaca, F. Teixidor, R. Kivekäs, R. Sillanpää, C. Viñas, *Dalton Trans*.2006, 4884.
[2] A. V.Puga, F. Teixidor, R. Kivekäs, R. Sillanpää, C. Viñas, *Chem. Commun*., 2011, 47, 2252.
[3] A. Pepiol, F. Teixidor, K. Saralidze, C. van der Marel, P. Willems, L. Voss, M. L.W. Knetsch, C. Viñas, L. H. Koole, *Biomolecules*, 2011 accepted.

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