

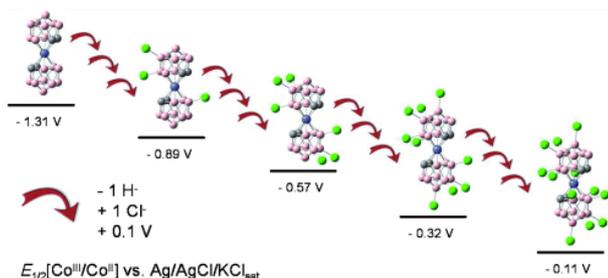
Exploring the hidden potentialities of boron clusters

Research Professor Francesc Teixidor (Institut de Ciència de Materials de Barcelona)

November 10, 2011 (Thu) 13:00-14:00
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>



One of the main problems that the boron scientific community faces, and very particularly the boron cluster community, is the difficulty in convincing funding agencies that boron cluster research can be of practical utility. Certainly it is utterly necessary that the typical subjects of applicative boron cluster research: the pacification of nuclear waste and the boron neutron capture therapy find other research areas with which to compete, so that the possible areas of technological application can be broadened. To accomplish this, great effort is necessary, and it is not easy, because the origins of the low applicability of boron compounds are not well defined. Among them certainly are the high cost of the starting materials, the small number of boron cluster research groups, the funding difficulty, the belief that the time of boron cluster chemistry is already gone, the general conviction that boron clusters are unstable and esoteric, and perhaps more importantly that boron cluster advocates have not been capable of convincing other scientists and technologists of the beneficial and in some cases unique properties of



boron clusters. My exposition will deal about the progress done in our laboratory in exploring new possibilities for boron clusters particularly in molecular materials, as potentiometric sensors [1], in the modification of surfaces [2], as ionic liquids [3], as doping agent in polypyrrole [4], as neutron sensors, or as vesicle forming agents [5], among others. Besides, progress done in finding new ways to generate B_{cluster}-C and B_{cluster}-P bonds will be described, as this is an important impediment to design and synthesize new molecules to explore new potentialities for the boron clusters

application. In the figure the stepwise reduction of the redox potential of [Co(C₂B₉H₁₁)₂] cluster is shown upon its stepwise dehydrochlorination. Approximately each new B_{cluster}-Cl produces an E_{1/2} reduction of 0.1V. After the substitution of 10 B-H's in [Co(C₂B₉H₁₁)₂] to generate [Co(C₂B₉H₆Cl₅)₂] a potential reduction from -1.31V to -0.11V has been achieved [6]. This is a unique observation not found in electroactive redox systems of potential technological interest such as ferrocene or fullerenes.

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Contact: Visiting Professor Tatsuya Tsukuda (Catalysis Research Center)
011-706-9155/tsukuda@cat.hokudai.ac.jp (連絡先:触媒化学研究センター・佃達哉)

