

Carborane-Appended Dendritic Molecules for Potential Materials Science and Medicinal Applications

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By Barada P. Dash

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Abstract

Carboranes are a class of boron rich compounds used as a boron drug delivery platform and also find applications in synthesis of materials. Although a number of boron drug delivery agents have been synthesized so far, delivery of adequate amount of boron to tissues which would enhance the effectiveness of the treatment is still considered as a challenging task. To achieve the requisite amount of boron concentration (about 30 $\mu\text{g }^{10}\text{B/g}$ tumor for an effective BNCT), the synthesis of macromolecules containing multiple carborane clusters have attracted significant attention. Macromolecular and dendritic drug delivery agents are also found to be superior in terms of accumulation and retention in the tumor tissues. Recently, we have reported the synthesis of symmetrical structures containing three carborane clusters at the periphery of the 1,3,5-phenylene core. These carborane clusters were attached via a boron atom (B-9 position) of the *o*-carborane.¹ The facile synthesis of fluorescent carborane-C_(cage)-appended symmetrical extended π -systems was also accomplished via silicon tetrachloride-mediated trimerization of the corresponding keto-precursors.² In an attempt to further increase the number of carborane clusters surrounding a symmetrical core, the facile synthesis of a dendritic structure containing six carborane clusters was also accomplished via cobalt catalyzed [2+2+2] cycloaddition reactions.³ The synthesis of such carborane appended symmetrical molecules along with their unique spectroscopic and thermal properties will be presented in detail.

References:

- 1) "Synthesis of a New Class of Carborane-Containing Star-Shaped Molecules via Silicon Tetrachloride Promoted Cyclotrimerization Reactions" **B. P. Dash**, R. Satapathy, J. A. Maguire, N. S. Hosmane, *Organic Letters*, **2008**,10, 2247–2250.
- 2) "Carborane-C_(cage)-Appended Hydrophilic and Fluorescent Extended π -systems" **B. P. Dash**, R. Satapathy, J. A. Maguire, N. S. Hosmane, *Submitted to Organic Letters*, **2009**. (In Review)
- 3) "Boron-Enriched Hydrophilic Dendrimers: Novel Drug Delivery Agents" **B. P. Dash**, R. Satapathy, J. A. Maguire, N. S. Hosmane, (*Communications*) *Submitted to Angewandte Chemie International Edition*, **2009**.