

Elaboration of well-defined supramolecular brush polymer involving β -cyclodextrin/adamantyl complexation

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β -Cyclodextrin (β -CD) is a cyclic oligosaccharide containing seven glycopyranose units. This torus-like molecule is characteristic of a hydrophilic exterior surface and a hydrophobic interior cavity, which can accommodate a wide range of guest molecules. This property is mainly used to help solubilize hydrophobic molecules by creating an inclusion complex. Adamantyl (Ada) groups are particularly interesting guests to the hydrophobic cavity of β -CD. Indeed, they can form highly bonded host-guest complex with β -CD, because of their fitting size. The host-guest interaction between β -CD and Ada can be used as a driving force to obtain supramolecular structures with different applications, such as polymeric network¹, thermoresponsive micelles² or surface grafting³.

This project aims to develop well-defined supramolecular brush-like architectures by combining polymer blocks end-functionalized by Ada groups and polymer blocks containing β -CD pendant groups. Ada blocks are generated by RAFT polymerization, mediated by an Ada functionalized CTA. Two ways of synthesizing CD polymer are investigated. In the first, a triazol-CD-monomer is synthesized and subsequently polymerized by RAFT. In the second method, CD-polymer is obtained by RAFT polymerization of propargyl methacrylate monomer, followed by Huisgen's 1,3-dipolar cycloaddition using azide functionalized β -CD. 2D ¹H NOESY NMR studies have shown that both Ada functionalized CTA and Ada blocks have been included within native β -CD cavities. Association between Ada blocks and CD grafted polymers will be studied later by NOESY NMR. The behavior in solution of the resulting brush structure will be investigated by DLS (micelles) and rheological measurements.

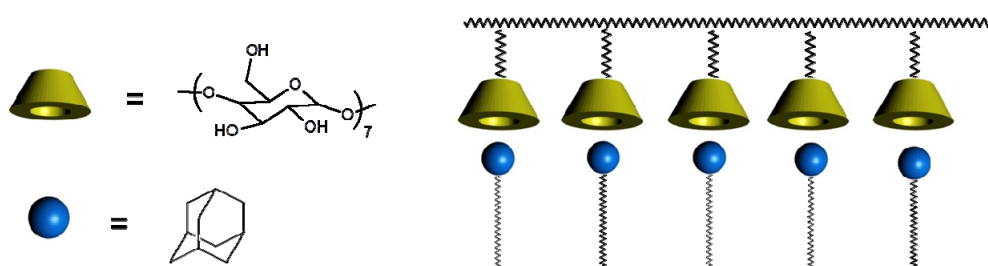


Figure 1 Schematic structure of the brush polymer resulting from the host/guest interaction Ada/ β -CD

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