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BORONIC ESTER AND HOMODIMERIZATION OF MOLECULAR CLIPS AS CROSS-LINK MOTIFS IN THE REVERSIBLE NETWORKS

Monika Gosecka

Polish Academy of Sciences, Poland

Polyglycidol of hyperbranched architecture (HbPGL) is able to interact with boronic acids thanks to vicinal diol groups present in the peripheral area of the macromolecule. As a result, injectable hydrogel systems can be formed at different pH conditions. Bioinert and protein antifouling characteristics of HbPGL makes hydrogels prepared from this polymer a suitable system for biomedical applications. Hydrogel environment turned out to be completely inert to alkaline phosphatase, which facilitated triggering the biomineralization

Due to the fact that diffusion of reagents limits the rate of enzymatic reactions within gel, the influence of polymer weight fraction and the length of cross-linking copolymer bearing boronic acid on the diffusivity of encapsulated in hydrogel molecules was estimated. The dynamics of macromolecules forming hydrogel network was monitored based on their diffusion coefficients using ¹H HR MAS DOSY NMR. Depending on the diffusivity, the course of biomineralization within hydrogel was different. ¹H NMR DOSY NMR spectra, along with standard ¹H NMR spectra, were also used to monitor the behaviour in solution of another type cross-link, which is a homodimer of molecular clips. By making use of this affinity, we can prolong the macromolecule

of the polymer or generate the polymer network. The affinity toward homodimerization is strictly dependent on the solvent, temperature and on the presence of other compounds, which can play the role of the guest molecules. Due to the fact that homodimerization is driven both by π - π interactions and hydrogen bonds formation, such solvents as DMSO prevents dimers formation, whereas for example chloroform stimulates the self-association of molecular clips.

Biography

Dr. Monika Gosecka is an adjunct in the Department of Engineering of Polymer Materials in the Centre of Molecular and Macromolecular Studies, Polish Academy of Sciences, CMMS PAS, Lodz. She obtained her PhD degree in 2013 at the CMMS PAS for investigating the mechanism of core-shell polymer particles formation and their properties. After PhD studies, she spent a one-year as a postdoc at École Supérieure de Physique et de Chimie Industrielles de la Ville de Paris working on the project involving vitrimer systems. Her current research interests include the formation of reversibly cross-linked hydrogels based on hyperbranched polyglycidol in view of biomedical applications.

mdybko@cbmm.lodz.pl