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Synthesis of Hyperbranched Polysiloxysilane Hybrid Copolymer: Convenient Linker Toward Easy Surface Modification, and Application to Thermoresponsive Surface for Cell Cultivation

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Cell sheet cultivation is an important topic of research regarding the regenerative medicine since no donors are required reducing greatly the possibility of rejection upon transplantation at short and long term. Current method of cell sheet cultivation is lacking an easy way to remove the sheet from the cultivation support without damaging it. In order to facilitate the removal of the sheet, recently, thermoresponsive cell culture surface has been developed using poly(*N*-isopropylacrylamide) (PNIPAM). Due to the drastic change in the hydrophilicity of PNIPAM [1], which exhibits a lower critical solution temperature (LCST) of 32 °C, it is possible to change the surface hydrophilicity by simply changing the temperature. Above the LCST, the hydrophobic surface permits the cell cultivation due to strong binding of the proteins with the surface, and by reducing the temperature below the LCST, the cell sheets spontaneously detach from the surface. However, the introduction of PNIPAM onto the surface is done by electron beam polymerization, which requires complicated and expensive equipment. Recently, our group design a hyperbranched polystyrene block PNIPAM [2], however, such system is limited to polystyrene (PSt) dish. In this thesis, we present an easy and convenient strategy to modify the surface of PSt dishes and glass slides [3] with PNIPAM by drop casting hyperbranched polysiloxysilane block poly(*N*-isopropylacrylamide) (HBPSi-*b*-PNIPAM). The main goal of this work is to obtain a system which can be introduced onto various surfaces.

[1] M. Heskins, J. E. Guillet, *J. Macromol. Sci. Chem.* **1968** *2*, 1441.

[2] Y. Sudo, H. Sakai, Y. Nabae, T. Hayakawa, M. A. Kakimoto, *Polymer* **2015** *70*, 307.

[3] R. Gillet, H. Sakai, Y. Nabae, T. Hayakawa, M. A. Kakimoto, *Polym. J*. **2016**, *48*, 10.