

Nano-coating of functional cyclosiloxane polymers containing dynamic covalent bond boronic acid

Soyeon Kim[†], Huie Zhu, Masaya Mitsuishi
Tohoku Univ.

(kim.soyeon@tohoku.ac.jp[†])

We noted cyclosiloxane with four functional groups as a good choice for post functionalization. A novel boronic-acid containing polycyclosiloxane was designed and synthesized through introduction of boronic acid side groups into the linear polycyclosiloxane backbone. The reaction was done using a one-pot-two-step hydrosilylation reaction: first, 4 functional cyclosiloxane reacted with 2 functional linear siloxane at a mixing ratio of 1:1 and second, mixed with allylboronic acid pinacol ester to react with the remaining -Si-H on the linear polycyclosiloxane. The chemical structures, film formation and thermal properties of the obtained polymers were characterized using NMR, FT-IR, AFM, and TGA. Then, boronic-acid-containing polycyclosiloxane was demonstrated that has low surface energy, which provide the polymer with good nanocoating capability. Finally, the nano-film was observed using dye molecules as reusable Zn ion sensitive optical probes.

[1] S. Kim, H. Zhu, A. Demirci, S. Yamamoto, T. Miyashita and M. Mitsuishi, *Polymer Chemistry*, 10, 5228–5235 (2019).