

Understanding fast transition of poly
(N-isopropylacrylamide) and polydimethylsiloxane composites

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Poly(N-isopropylacrylamide) (PNIPAm) has been investigated for a long time, because of its unique soluble-insoluble change at lower critical solution temperature. The transition speed of PNIPAm need to be accelerated because the current slow transition has made its applications difficult such as actuator. In our previous study, we developed thermo-responsive film, composed of PNIPAm hydrogels and polydimethylsiloxane (PDMS), could deswell to 10% of its initial volume in 12 sec. To improve deswelling rate more, PNIPAm hydrogel having various pore sizes were prepared by directional melt crystallization and infiltrated PDMS into the pores of PNIPAm. We adjusted the pore sizes of PNIPAm by controlling the concentration of NIPAm solutions, and the content of PDMS phase in composites was adjusted by the pore size of PNIPAm in turn. As a result, we demonstrated the transition rate of PNIPAm/PDMS composite could be controlled by PDMS phase in composites.