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MOLECULAR ASSEMBLY OF POLY(DL-N-ISOPROPYLASPARTAMIDE-*co*-SUCCINIMIDE) DERIVATIVES

T. Ono, N. Sugita, F. Tanimoto

Department of Material and Energy Science, Okayama University, 3-1-1 Tsushima-Naka, Okayama, Okayama, 700-8530, Japan (tono@cc.okayama-u.ac.jp)

Poly(asparamide) was synthesized from poly(succinimide) (PSI) and nucleophilic amino compound, and which set up functional groups in a side chain. In this study, we developed thermo-responsive poly(aspartamide), poly(D,L-aspartate isopropylamide-*co*-succinimide) (IPA-PSI), by installing isopropylamine on PSI.

Isopropylasparamide units strongly affected the phase transition behavior of the aqueous solution. IPA-PSI with more than 30 mol% of isopropylaspartamide unit can be soluble in water and gives phase transition as well as poly(isopropylacrylamide) while PSI is insoluble in water. Furthermore, the reversibility of the thermal phase transition depended on the degree of isopropylasparamide units in a polymer. This is due to the interaction between the amide units in the main chain.

We also synthesized IPA-PSI derivatives with one dodecyl group in the terminal. This dodecyl-terminated IPA-PSI (t-DA-IPA-PSI) exhibited lower critical micelle concentration (CMC) at 0.01 – 0.02 wt% than IPA-PSI (0.03 – 0.04 wt%). From a fluorescence measurement using pyrene as a hydrophobic probe, we found that the molecular assembly of t-DA-IPA-PSI formed hydrophobic domain. Therefore, the introduction of a dodecyl-terminated group into the copolymer shows high surface activity, and which brings about hydrophobic domain through the molecular assembly.

In addition, we examined the thermo-response of t-DA-IPA-PSI assemblies using a fluorescence measurement and dynamic light scattering. These results indicated that hydrophobic compounds were stably incorporated in the hydrophobic domain even if the phase transition based on the IPA was occurred.