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PRERARATION OF POLYMERIC PARTICLES WITH POLY(ASPARTIC ACID) HAIRY CHAINS

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The aim of this work is to develop a method for preparing hairy particles which is capable of introducing functional groups. Dispersion copolymerization of hydrophobic monomer and macromonomer is a one-pot process for preparing hairy particles. Therefore, we synthesized macromonomer based on sodium polyaspartate (PAspNa) as a reactive stabilizer for preparation of hairy particles. Poly(succinimide) (PSI), a precursor of PAspNa, can react with amino compounds to introduce functional groups in the side chain. Thus, dispersion copolymerization using the PAspNa macromonomer is promising for development of the functional hairy layer on the particle surface.

PSI derivatives with a hydroxyphthalimide end group were synthesized by thermal polycondensation of L-aspartic acid and 4-hydroxyphthalic acid. PAspNa macromonomers were obtained by a reaction of the PSI derivatives and acryloyl chloride, and hydrolysis by sodium hydroxide solution. By the dispersion copolymerization of styrene and PAspNa macromonomer in a mixture of ethanol and water, sub-micron sized polymeric particles were prepared. Figure 1 shows the transmission electron microscopy (TEM) image of ultrathin cross section of the particles prepared with PAspNa macromonomer which is stained by osmium tetraoxide and phosphotungstic acid. It showed that the resultant particles were covered with a PAspNa layer. Hydrodynamic diameter of the particles was investigated by dynamic light scattering method. Hydrodynamic diameter of the particles decreased with increasing electrolyte concentration. This result supports PAspNa chains on the particle surface are extending into water. When the PAspNa macromonomer with high molecular weight was used for preparation of the particles, the change in hydrodynamic diameter was larger.

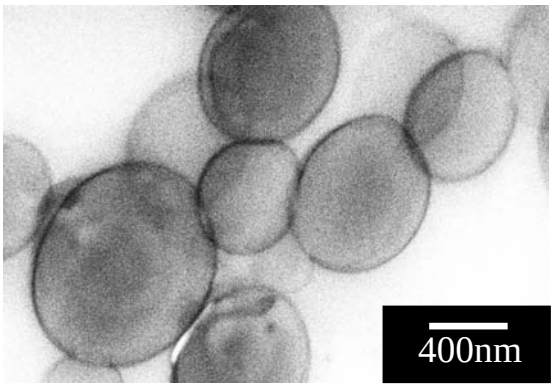

Fig. 1 TEM image of ultrathin cross-section of the particles with a PAspNa hairy layer. PAspNa was stained by osmium tetraoxide and phosphotungstic acid.