KL 02

HETEROPHASE POLYMERIZATION AS SYNTHETIC TOOL IN POLYMER CHEMISTRY

K. Tauer, N. Weber

Max Planck Institute of Colloids and Interfaces, Department of Colloid Chemistry, Am Mühlenberg, D-14476 Golm, Germany

Radical heterophase polymerization is suitable for the comparably easy synthesis of specialty polymers as for instance amphiphilic block copolymers. The blocks are built sequentially in a way that hydrophobic block(s) are formed during the heterophase polymerization. The hydrophilic blocks act as polymeric stabilizers and the hydrophobic blocks form the cores of the particles or micelles. In certain cases it is possible to incorporate further blocks which can be either hydrophilic or hydrophobic or even consist of statistical copolymers. Utilizing this principle various unique block copolymers as well as latex particles with special properties have been prepared as for instance polystyrene-b-poly(styrene sulfonate) block copolymers, or double hydrophilic block copolymer particles, or poly(styrene sulfonate)-b-poly(methacrylic acid) combining strong and weak acids in one molecule, or thermo-responsive block copolymers with poly(N-isopropyl acrylamide).

The synthesis strategy has been successfully applied to produce silica-containing block copolymer particles in an one-step procedure. If the block copolymers contain blocks of a film forming polymer [poly(meth)acrylates] the silica blocks lead to an increased hydrophobicity of the films. The Si – containing block copolymer particles are converted during calcination at 550 °C into silica nanoparticles with a special morphology that depends on the nature of the precursor block copolymer.