Continuous one-pot synthesis of surface-modified iron oxide nanoparticles using supercritical methanol

밤방, 박현채, 김재훈*, 김재덕
KIST
(jaehoonkim@kist.re.kr*)

Supercritical methanol provides an excellent reaction medium for continuous synthesis of surface-modified nanoparticles because homogeneous metal salt solution and organic surface modifier solution can be introduced into a flow type reactor continuously, and line and filter clogging problems by unreacted, precipitated surface modifier in water at ambient condition can be avoided. In this work, continuous, one-pot synthesis of surfaced modified iron oxide nanoparticles in supercritical methanol was examined by using decanoic acid ($C_9H_{19}COOH$) as a surface modifier. Wide angle X-ray diffraction (WAXD) analysis revealed that the synthesized nanoparticles were in magnetite (Fe_3O_4) phase. Fourier transform infrared (FTIR) spectroscopy indicated the existence of an organic layer on the surface of nanoparticles. The results of scanning electron microscopy (SEM) and transmission electron microscopy (TEM) images showed that the surface modification affected crystal growth and reduces the particle size.