

Investigation of Self-Assembling of Maghemite Nanoparticles into Chain-Like Structures Using Birefringence Measurements

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Abstract : In this study, static magnetic birefringence (SMB) and transmission electron microscopy (TEM) were used to investigate the self-assembling of maghemite nanoparticles suspended as biocompatible magnetic fluid (BMF) while incubated or not with the Black Eyed-Pea Trypsin Chymotrypsin Inhibitor-BTCI protein. The stock samples herein studied are dextran coated maghemite nanoparticles (average core diameter of 7.1 nm, diameter dispersion of 0.26, and containing 4.6×10^{16} particle/mL) and the dextran coated maghemite nanoparticles associated with the BTCI protein. Several samples were prepared by diluting the stock samples with deionized water while following their colloidal stability. The diluted samples were investigated using SMB measurements to assess the average sizes of the self-assembled and suspended mesoscopic structures whereas the TEM micrographs provide the morphology of the as-suspended units. The SMB data were analyzed using a model that includes the particle-particle interaction within the mean field model picture.

Keywords : biocompatible magnetic fluid, maghemite nanoparticles, self-assembling

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