Synopsis of Original Research Paper

Structure and Properties of Dispers Systems of Ultra Fine Particle and Development of Auto-Controlled Colloids

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Microscopic structure and properties of ultra fine colloidal particles in aqueous systerns were studied using a small angle X-ray scattering and rheological methods. The fine particle studied are micelles of N^{α}, N^{α}-dimethyl-N^{α}-lauroyllysine (DMLL, amphoteric surfactant) and octa (oxyethylene) monododecylether (C12E8, nonionic surfactant), a small vesicle of didodecyldimethyl ammonium bromide (DMA, cationic surfactant) and a globular protein molecule of ovalbumin (OA).

The scattering intensity I changes according to $I = K_1 q^{-4} + K_2$ in a relatively wide angle region. Here q is the wave vector and K_1, K_2 are constants. The surface roughness defined by the ratio of O_{so}/O_s, where O_s and O_{so} are the specific inner surface of the colloidal particle and a completely smooth sphere, are ca. 3.5 for the DMLL micelle, ca 2 for the C12E8 micelle, ca. 1.7 for the OA molecule and ca. 5 for the DMA vesicle.

The rheological properties of the OA colloids are very characteristic, i.e. the systems show yield stress σ_y, and rigidity G at extremely low concentration of 10^{-4} g/ml and the values of σ_y and G remain almost constant over a wide concentration range from 0.1 to 30 wt%. This phenomenon suggests that the OA system has some auto-controlled mechanism in order to suppress the increase in σ_y and G.