Synopsis of Original Research Paper

Formation of the Novel Dispersion System "Liquid Crystalline Emulsion" with Lipid-Polymer Surfactant Mixtures

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Aqueous dispersions of lyotropic liquid crystalline phases were prepared by highpressure emulsification using lipid mixtures, monoolein (MO) and oleic acid (OA), and emulsifier Pluronic F127 with changing their composition. The size and internal structure of the prepared particles were characterized by dynamic light scattering and small-angle X-ray scattering, respectively. In MO/F127/buffer system with 8 wt % F127 to MO, particles with a diameter of ca.180 nm and including bicontinuous cubic phases (cubosomes) were formed. The lipid ratios strongly affected the morphology of the internal structure of the particles. By increasing the weight fraction of OA in the lipid mixtures, the internal structure transformed in the order of bicontinuous cubicinverted hexagonal-inverted cubic.

¹³C NMR experiments with paramagnetic shift reagent showed that the signal of carbonyl carbon of oleic-1-¹³C acid mixed in the cubosomes readily shifted to a lower magnetic field by addition of europium ion (Eu³⁺), indicating high accessibility of the ion into the water channel inside the particles.

The cubosomes were stable in buffer, but collapsed in the presence of serum albumin or plasma. Gel filtration experiments revealed that albumin has the ability to extracts MO from cubosomes and subsequently disintegrate the particles.