Conference abstract LDD04

New Hierarchically Organized Systems for Delivery

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Sci Pharm. 2010; 78: 558 doi:10.3797/scipharm.cespt.8.LDD04

Monoglycerides, Phytantriol and a few other lipophilic molecules self-assemble in bulk in presence of water to form well defined liquid crystalline phases. Their structure can be tuned by temperature variation and/or by addition of oils. This leads to gel-like or fluid systems with a large internal interface between water and oil domains with different bulk viscosities. These nanostructured phases can be dispersed in the excess water phase by addition of an external stabilizer and energy input leading to internally self-assembled particles, so-called ISAsomes [1–4]. These ISAsomes are potential carrier systems for hydrophilic, amphiphilic and lipophilic functional molecules.

The hierarchical structure can be extended to a next level by gellifying the continuous aqueous phase by the addition of polymers like κ–Carrageenan or Methylcellulose. This leads to a new type of hydrogel, loaded with ISAsomes [5, 6]. Differently to the original oil-continuous bulk phase, the viscosity of this, now water-continuous, system can be varied in a wide range by composition. These gels can even be dried into foils and re-dispersed on demand.

Finally, we can use the oil-continuous nanostructured bulk phase to create concentrated, stable water in oil emulsions having a paste-like consistency and water content from 50% up to 90% by volume. No additional stabilizer is needed to create these systems. They have a great potential as delivery systems for functional molecules in very different fields like pharmaceutical and cosmetic applications, as well as in food science and agro-chemistry.

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