High Throughput Study to Evaluate Steric Stabiliser for Cubic Lyotropic Liquid Crystalline Nanoparticles

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Nanostructured lyotropic liquid crystalline colloidal particles (i.e. cubosomes) are gaining interest in applications such as drug delivery and imaging agent encapsulation systems. It is therefore essential that the stability and integrity of these nanoparticles is maintained over time. This study investigates alternative stabilisation agents to the extensively used Pluronic F127, which will impart a steric barrier to prevent aggregation of cubosomes. Using high throughput methodologies in preparation and characterisation of monoolein and phytantriol dispersions, we were able to rapidly assess the performance of a wide range of non-ionic stabilisers (i.e. Pluronic, Tween, Myrij). This study shows that Pluronic F108 is superior to Pluronic F127 as a stabiliser of monoolein based nanoparticles, as it preserved the integrity of the double diamond inverse bicontinuous cubic phase (Pn\text{3m}), typically observed with bulk monoolein \cite{1}, and provided equivalent or superior colloidal stability.

The stabilisation of phytantriol dispersions by Myrj 59 was also equivalent to Pluronic F127 at lower stabiliser concentrations, while preserving the internal nanostructure.