ESRF	**Experiment title:** Liquid crystalline nanostructures and nanoparticles formed by self-assembly of amphiphilic cyclodextrins and monoolein, a non-lamellar lyotropic lipid.	**Experiment number**: MX-1865
Beamline: BM29	**Date of experiment**: from: 24/10/2016 to: 25/10/2016	**Date of report**: 09/04/2017
Shifts: 3	**Local contact(s)**: SANTONI Gianluca	*Received at ESRF:*

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Report:

The experiments carried out during this proposal were published in:

New nanoparticles obtained by co-assembly of amphiphilic cyclodextrins and nonlamellar single-chain lipids: Preparation and characterization

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Abstract:

This work aimed at preparing new nanoscale assemblies based on an amphiphilic bio-esterified β-cyclodextrin (β-CD), substituted at the secondary face with *n*-decanoic fatty acid chains (β-CD-C_{10}), and monoolein (MO) as new carriers for parenteral drug delivery. Stable binary (β-CD-C_{10}/MO) and ternary (β-CD-C_{10}/MO/stabilizer) nanoscale assemblies close to 100 nm in size were successfully prepared in water by the solvent displacement method. The generated nanoparticles were fully characterized by dynamic light scattering, transmission electron microscopy, small-angle X-ray scattering, residual solvent analysis, complement activation and the contribution of each formulation parameter was determined by principal component analysis. The β-CD-C_{10} units were shown to self-organize into nanoparticles with a hexagonal supramolecular packing that was significantly modulated by the molar ratio of the constituents and the presence of a steric or electrostatic stabilizer (DOPE-PEG_{2000} or DOPA/POPA, respectively). Indeed, nanoparticles differing in morphology and in hexagonal

lattice parameters were obtained while the co-existence of multiple mesophases was observed in some formulations, in particular for the β-CD-C_{10}/MO/DOPA and β-CD-C_{10}/MO/POPA systems. The mixed β-CD-C_{10}/MO/DOPE-PEG_{2000} nanoparticles (49:49:2 in mol%) appeared to be the most suitable for use as a drug delivery system since they contained a very low amount of residual solvent and showed a low level of complement C3 activation.

NB: the experiments, originally planned from 29 to 30 June 2016, could not be carried out due to technical constraints.