Electronic Supplementary Material (ESI) for Faraday Discussions.


## Supplementary Information

# Amphiphilic brush polymers produced by the RAFT polymerisation method stabilise and reduce the cell cytotoxicity of lipid lyotropic liquid crystalline nanoparticles

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**Supplementary Information**

## $^1$H NMR characterisation

$^1$H NMR spectra of purified polymers were obtained with a Bruker Avance 400 MHz spectrometer ($^1$H 400 MHz) in $D_2O$. The spectra (Figure S4) was used to determine the conversion of the monomer by comparing the integrity of vinyl proton peaks to that of aliphatic proton peaks. Polymer purity was confirmed by $^1$H NMR spectroscopy through the absence of monomer peaks. Number-average molecular weight was determined using the equation $M_n$ = ([PEGA]/[CDP]) x $MW_{monomer}$ x conversion + $MW_{P(PEGA)}$.

## GPC characterisation

Gel permeation chromatography (GPC) measurements were performed on a Shimadzu system equipped with a CMB-20A controller system, a SIL-20A HT auto-sampler, a LC-20AT tandem pump system, a DGU-20A degasser unit, a CTO-20AC column oven, a RDI-10A refractive index detector and with 4 Waters Styragel columns (HT2, HT3, HT4, HT5 each 300 × 7.8 mm) providing an effective molar mass range of ($100 – 4 \times 10^6$) and with *N*,*N*-dimethylacetamide (DMAc) containing 2.1 g/L of lithium bromide (LiBr) as eluent with a flow rate of 1 mL/min at 80 °C. The molar masses in poly(methyl methacrylate) (PMMA) equivalents were obtained from a calibration curve constructed with low dispersity PMMA standards (Polymer Laboratories). A third-order polynomial was used to fit the log $M_p$ versus time calibration curve, which was approximately linear across the molar mass range from 1,020 to 1,944,000 g/mol.

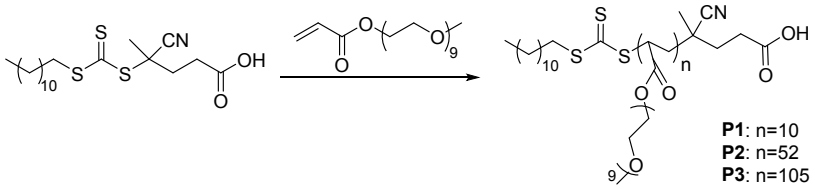


Figure S1: Synthesisof P(PEGA) polymers. Initiator: V501; Solvent: ethanol; Reaction temperature: 70 °C; Degasing: high purity Ar purging.

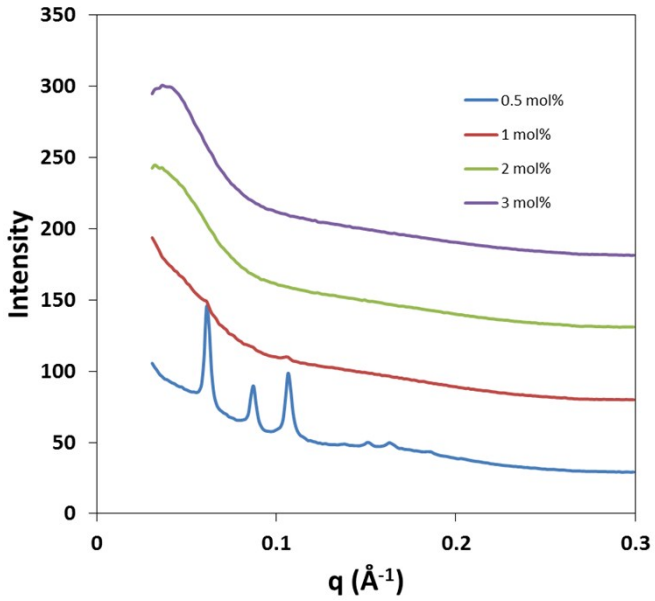


Figure S2: Effect of Pluronic F127 concentration on the lyotropic liquid crystalline phase of monoolein dispersions.

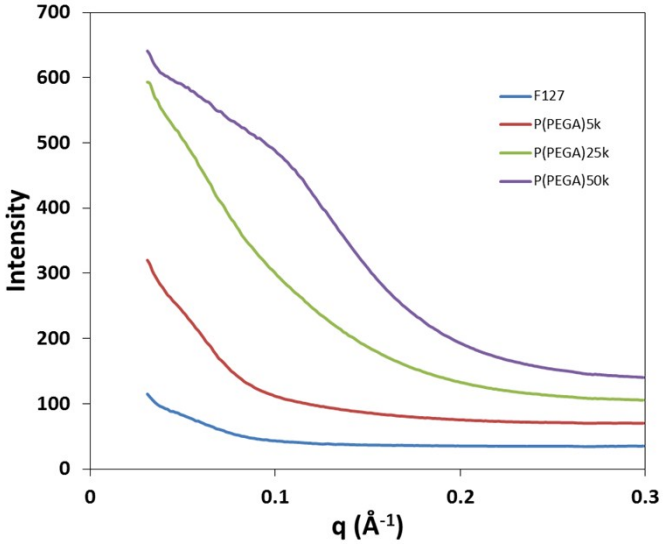


Figure S3: SAXS scattering profiles of P(PEGA) and Pluronic F127 polymer solutions at 3 mol% in water, showing no presence of the double-diamond or primitive cubic phase.

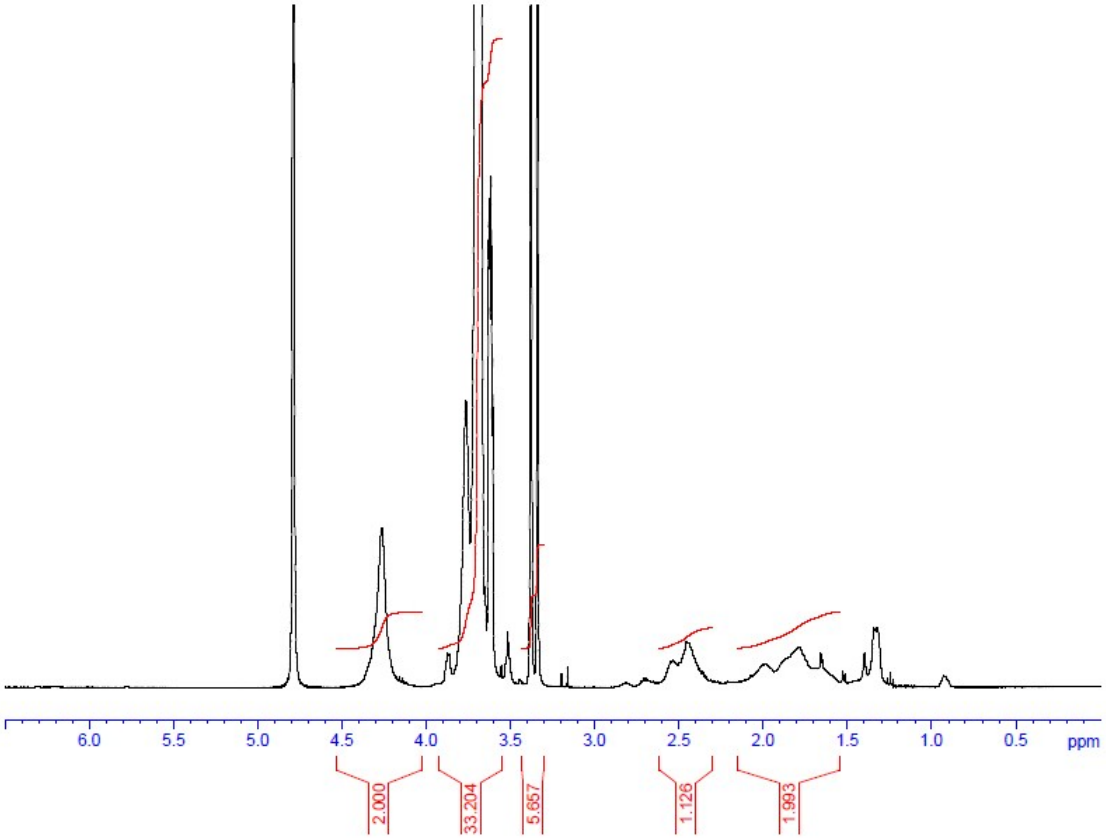


Figure S4: Representative $^{1}H$ NMR spectra of polymer $P(PEGA)_{5k}$.