

## Supporting document

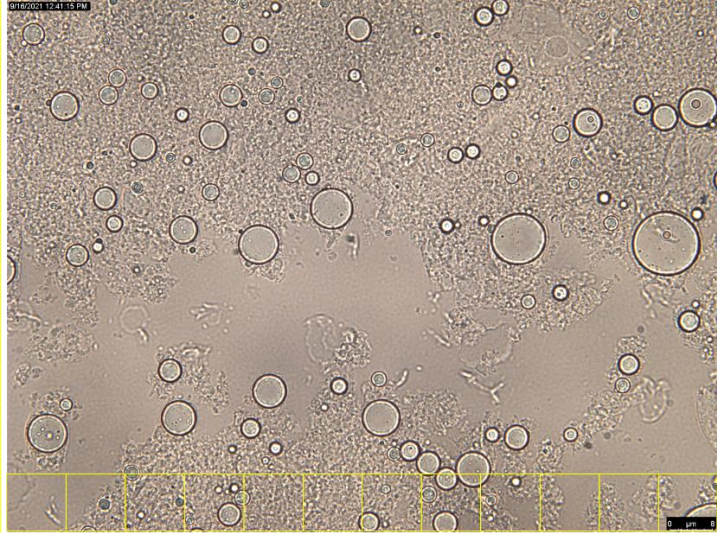
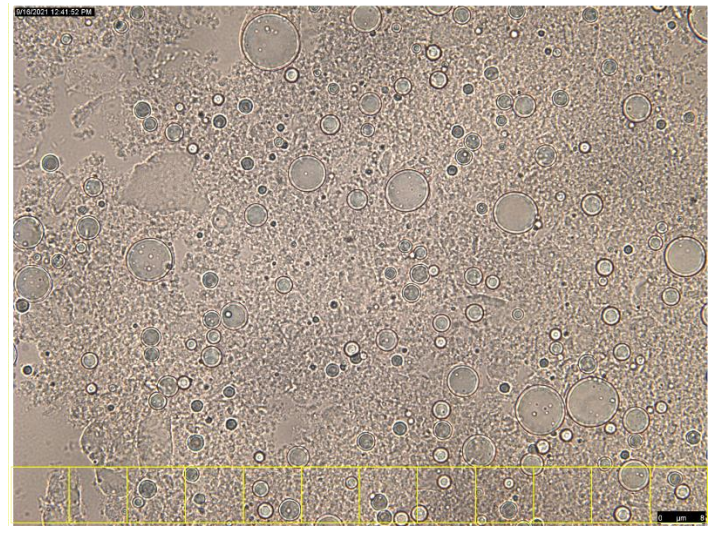
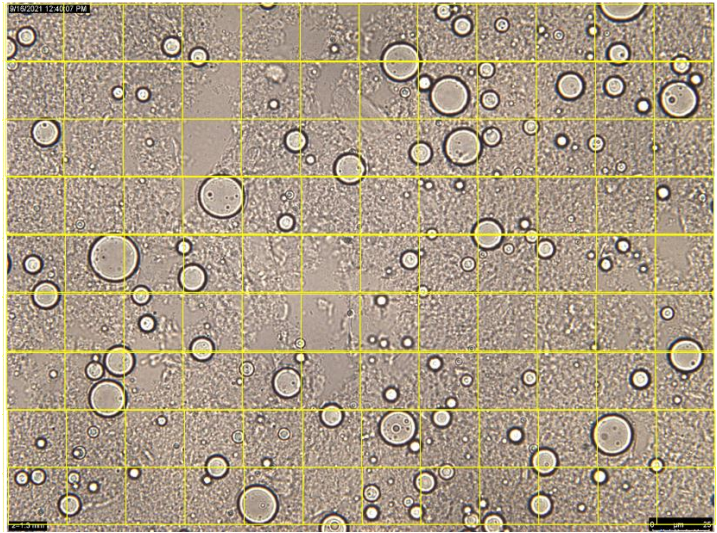
### **Amphiphilic Interaction Mediated Ordering of Nanoparticles in Pickering Emulsion Droplets**

Debasis Sen<sup>\*1,4</sup>, Avik Das<sup>1</sup>, Ashwani Kumar<sup>1</sup>, Jitendra Bahadur<sup>1,4</sup>, Rajesh K Chaurasia<sup>3</sup>, Arshad Khan<sup>3</sup>,  
Rajib Ganguly<sup>2,4\*</sup>

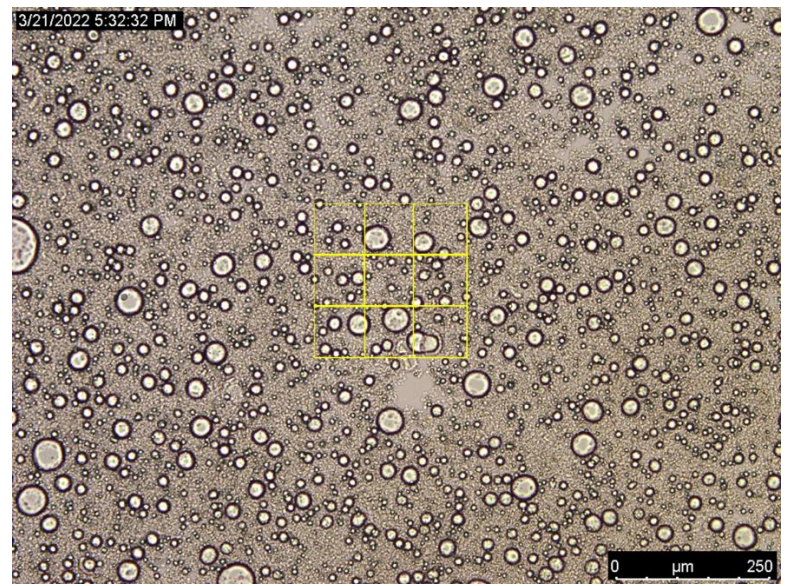
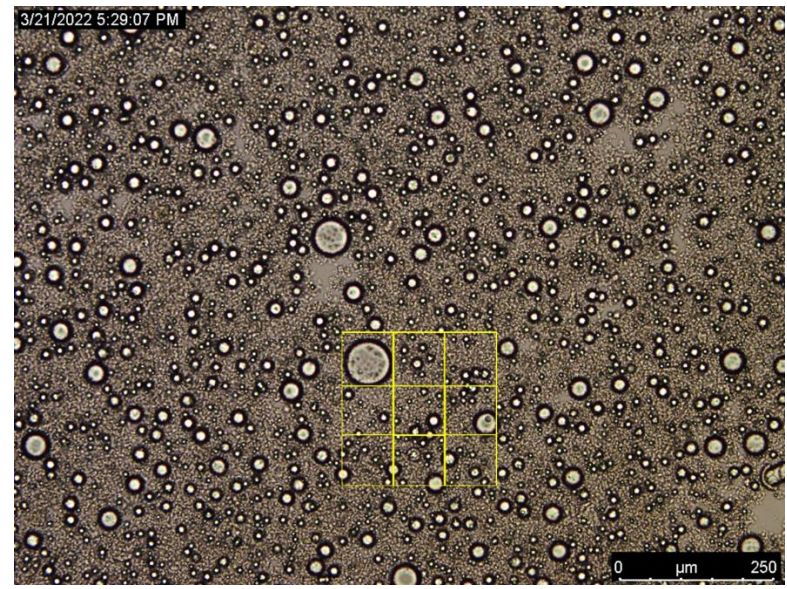
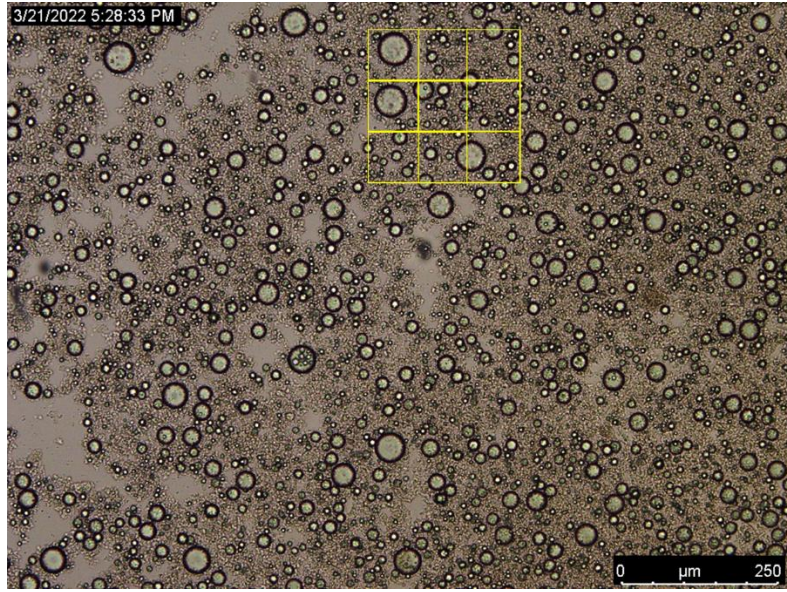
<sup>1</sup>Solid State Physics (<sup>2</sup>Chemistry, <sup>3</sup>Radiological Physics and Advisory) Division, Bhabha Atomic Research Centre, Mumbai-400 085

<sup>4</sup>Homi Bhabha National Institute, Anushaktinagar, Mumbai-400 094

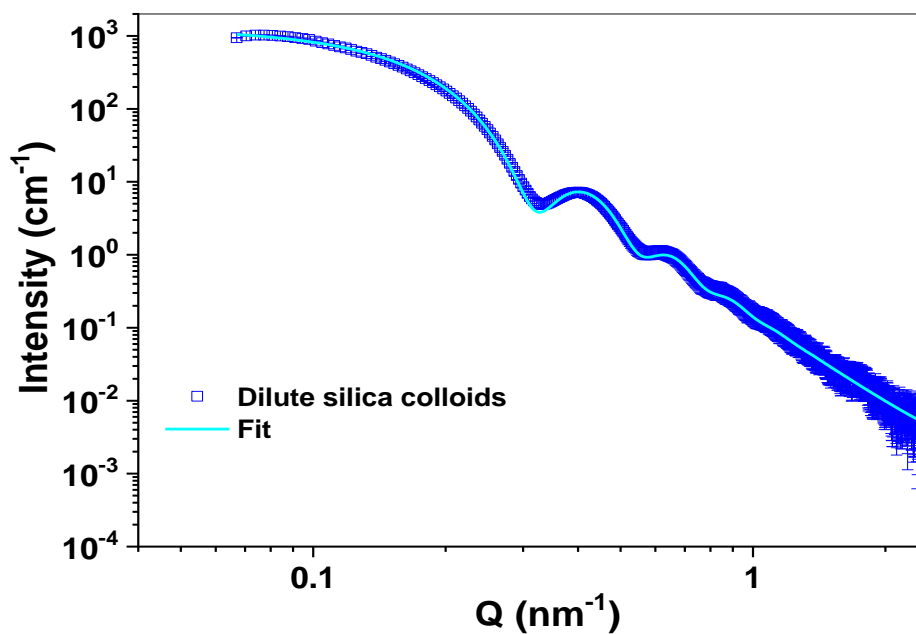
Email: [debasis@barc.gov.in](mailto:debasis@barc.gov.in), [rajibg@barc.gov.in](mailto:rajibg@barc.gov.in)



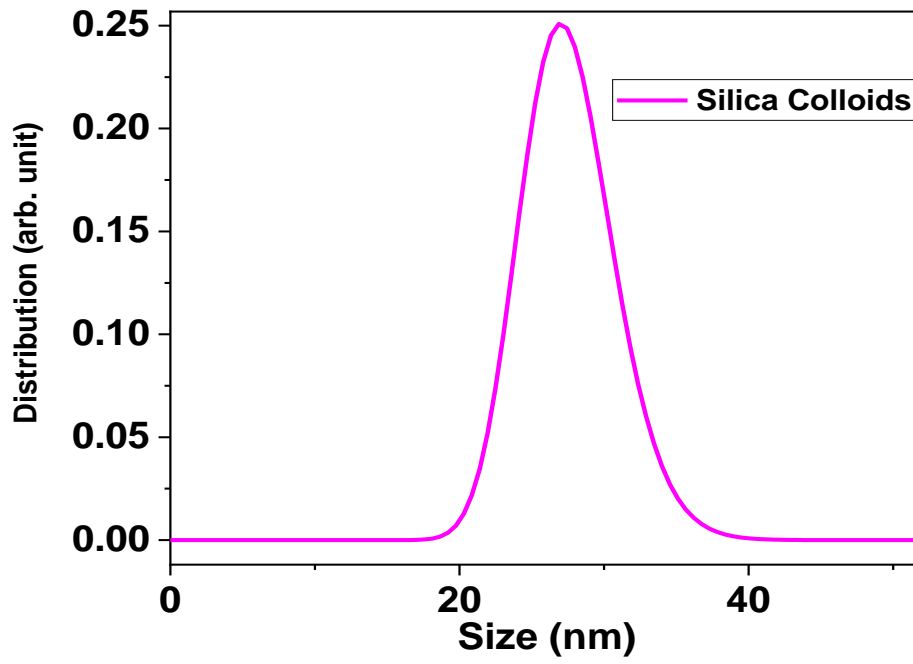
- 50μm
- 25μm
- 12.5μm
- 6.25μm



**Fig. S1:** Optical micrographs those were used for estimating the droplet size distributions. The top three micrographs are for the freshly prepared emulsion while the bottom three micrographs are for the aged emulsion after six months.

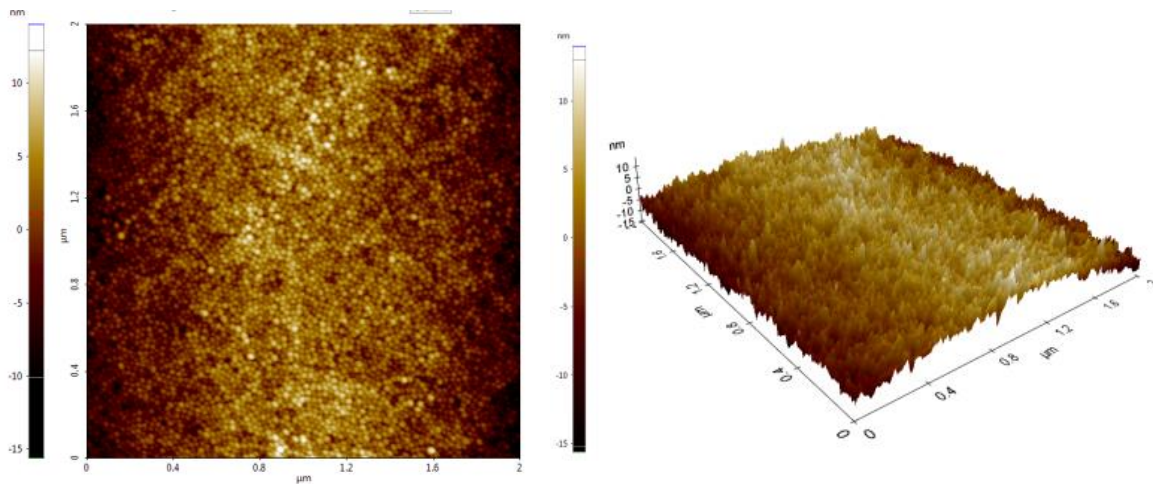


**Fig. S2:** Scattering profile from the dilute silica dispersion. The data were analyzed in the light of non-interacting polydisperse spherical particle model. The size distribution of the nanoparticles was determined (Fig. S3).

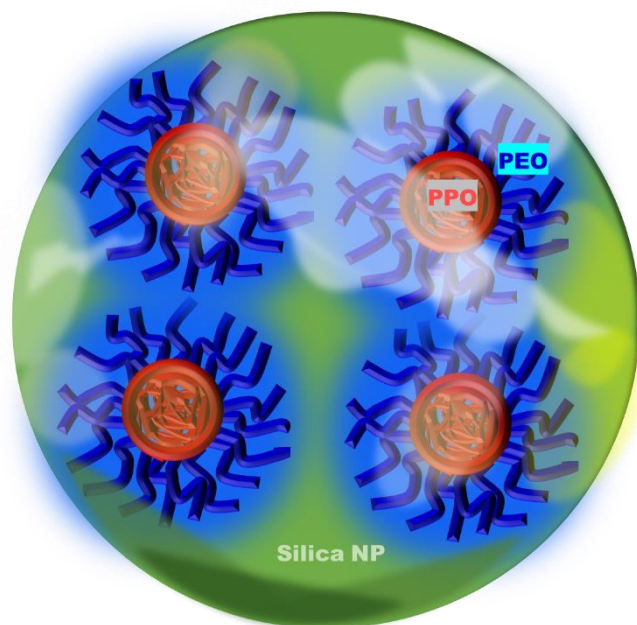


**Fig. S3:** Estimated size distribution of the silica colloidal particles from the data shown in Fig. S2.

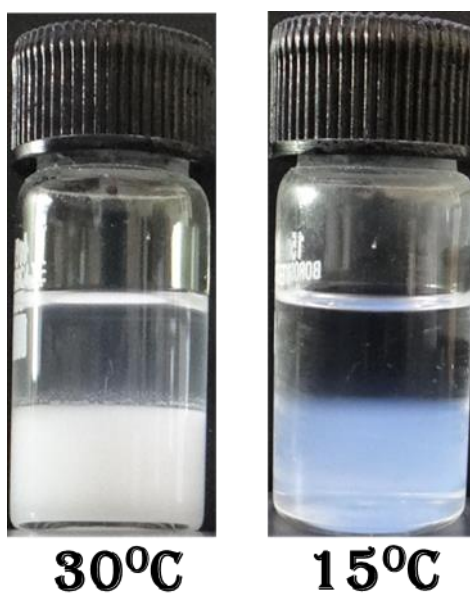
Here, the term size refers to the diameter of the particles.



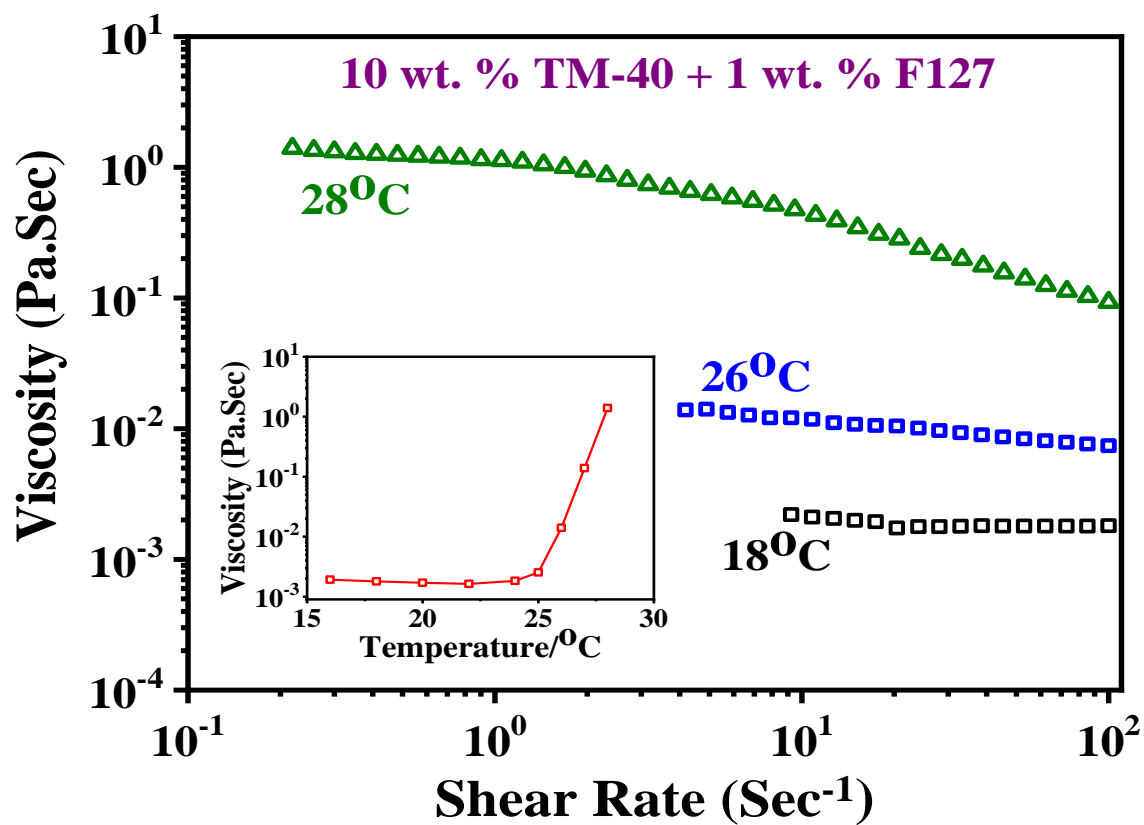
**Fig. S4:** Atomic Force Microscopy (AFM) picture of dried emulsion droplet. The average surface roughness was found to be 3 nm.



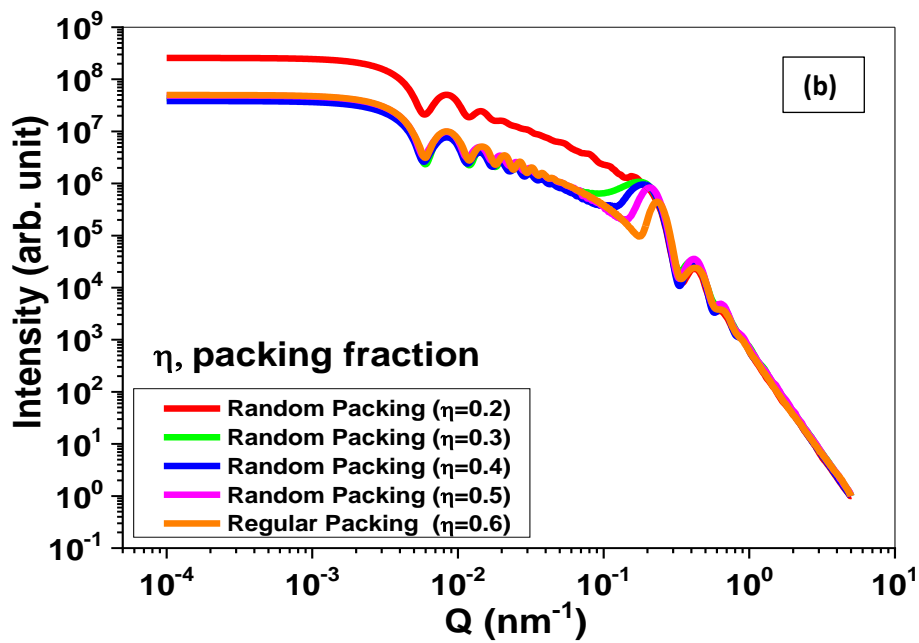
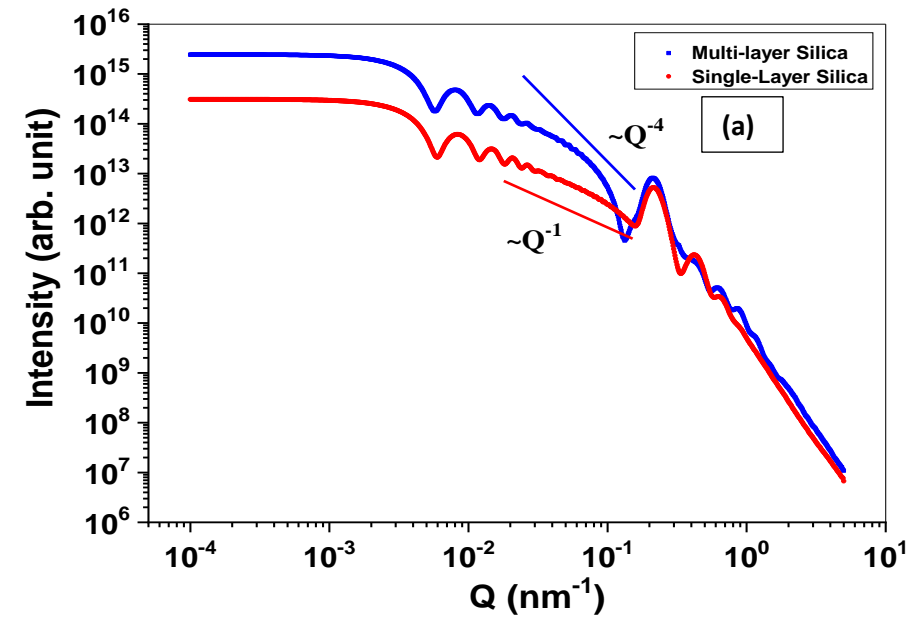
**Fig. S5:** Pictorial representation of F127 micelle decorated silica nanoparticles. This is the situation of Silica-F127 system without oil.



**Fig. S6:** Phase separation in 8% TM 40 solution with 1% Pluronic F127 at two different temperatures.

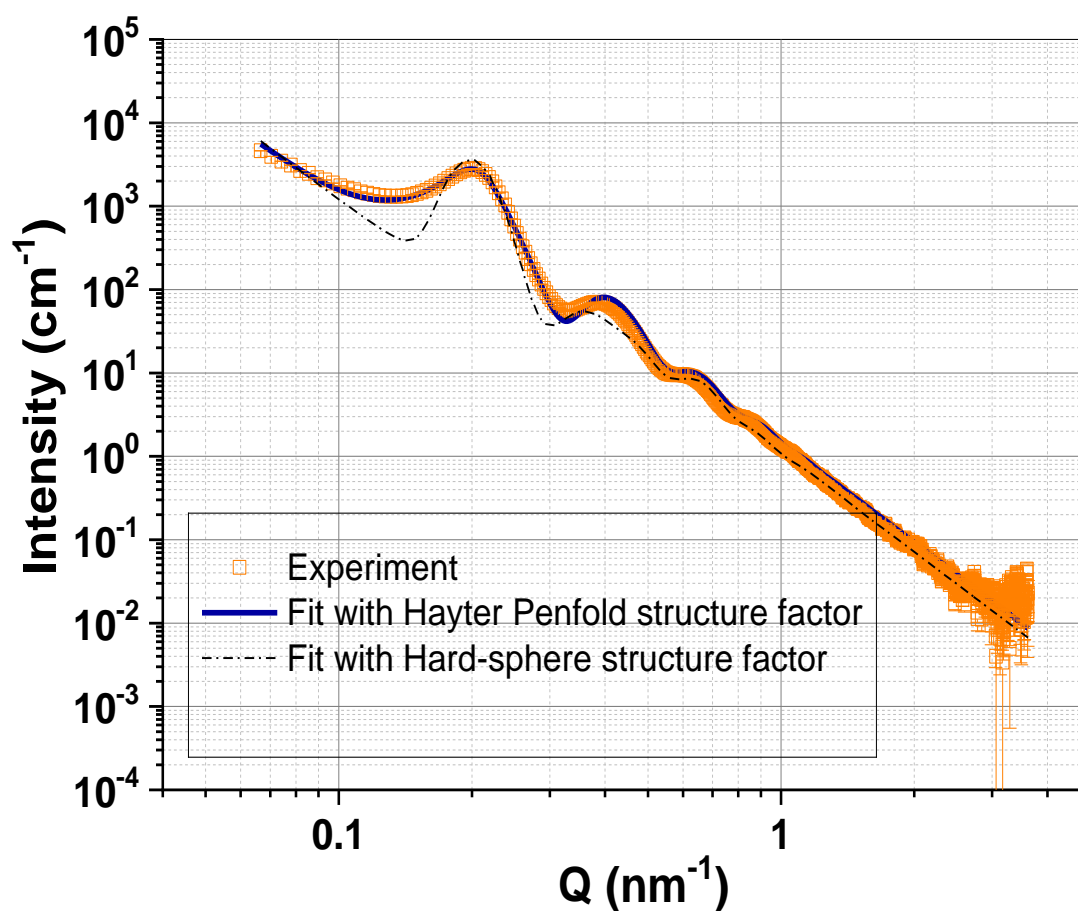


**Fig. S7:** Evolution of rheological properties of solution containing 10 wt. % TM-40 and 1 wt. % F127 as a function of temperature. Inset shows viscosity vs. temperature plot of the solution.



**Fig. S8:** Simulated scattering profile from computer model: (a) comparison of scattering profiles for multi and single layer case. (b) with different type of packing,





**Fig. S9:** Comparison of fitting of i) Hayter Penfold RMSA and (ii) hard sphere models to the experimental data. It is seen that unlike Hayter-Penfold RMSA model (solid line), the hard sphere model (dashed line) represents the experimental profile only partially.

**Table S1.** Results of size distribution analysis of Pickering emulsion droplet images

Average size of droplets	
Day 0	6 Months
$7.45 \pm 0.33 \mu\text{m}$	$9.74 \pm 0.49 \mu\text{m}$

Number of droplets in $67500 \mu\text{m}^2$ area	
Day 1	6 Months
$141.34 \pm 12.1$	$77.34 \pm 14.9$