

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: In this movie, we show an animation of the reconstructed 3D images (obtained from the maximum intensity projection for each image in the z-stack) of CS in oil system without (left panel) and with 0.2% surfactant (right panel) under 20X magnification. In both the cases, the initial volume fraction of CS is 0.05. The z-stack images were captured using a confocal microscope with a z-spacing of 0.68 μm once the particles are settled to form a stable bed. Since the intensity of the images gets reduced with increasing depth due to the opaque nature of the particles, gamma and brightness/contrast correction was applied to the images before the 3D reconstruction. It can be seen that the thickness of the 3D volume is more for the adhesive system (without surfactant) as compared to that for the repulsive system (with added surfactant). This confirms our hypothesis that once the inter-particle adhesive interaction is removed, the particle strands can no longer sustain their weight and hence collapse to form a more uniformly distributed bed. The 2D distribution of the particles in the x-y plane (as seen from the starting images in the animation) shows a very uniform distribution in the repulsive case (with surfactant) as compared to the adhesive case (without surfactant) where clear particle aggregation and void formation can be observed.

File Name: Supplementary Movie 2

Description: In this movie, we show an animation of the reconstructed 3D images of CS in oil system without (left panel) and with surfactant (right panel) under 40X magnification. Other parameters are same as Movie 1. Once again the thickness of the 3D volume is more in the case without surfactant (the adhesive system) as compared to the surfactant case (the repulsive system). The 2D image of the particle distribution in x-y plane with the higher magnification shows the structural heterogeneity in the adhesive case even more clearly than that observed with 20X.