Electronic Supplementary Material (ESI) for Soft Matter.

Characterizing the Spatiotemporal Evolution of Paramagnetic Colloids in Time-varying Magnetic Fields with Minkowski Functionals

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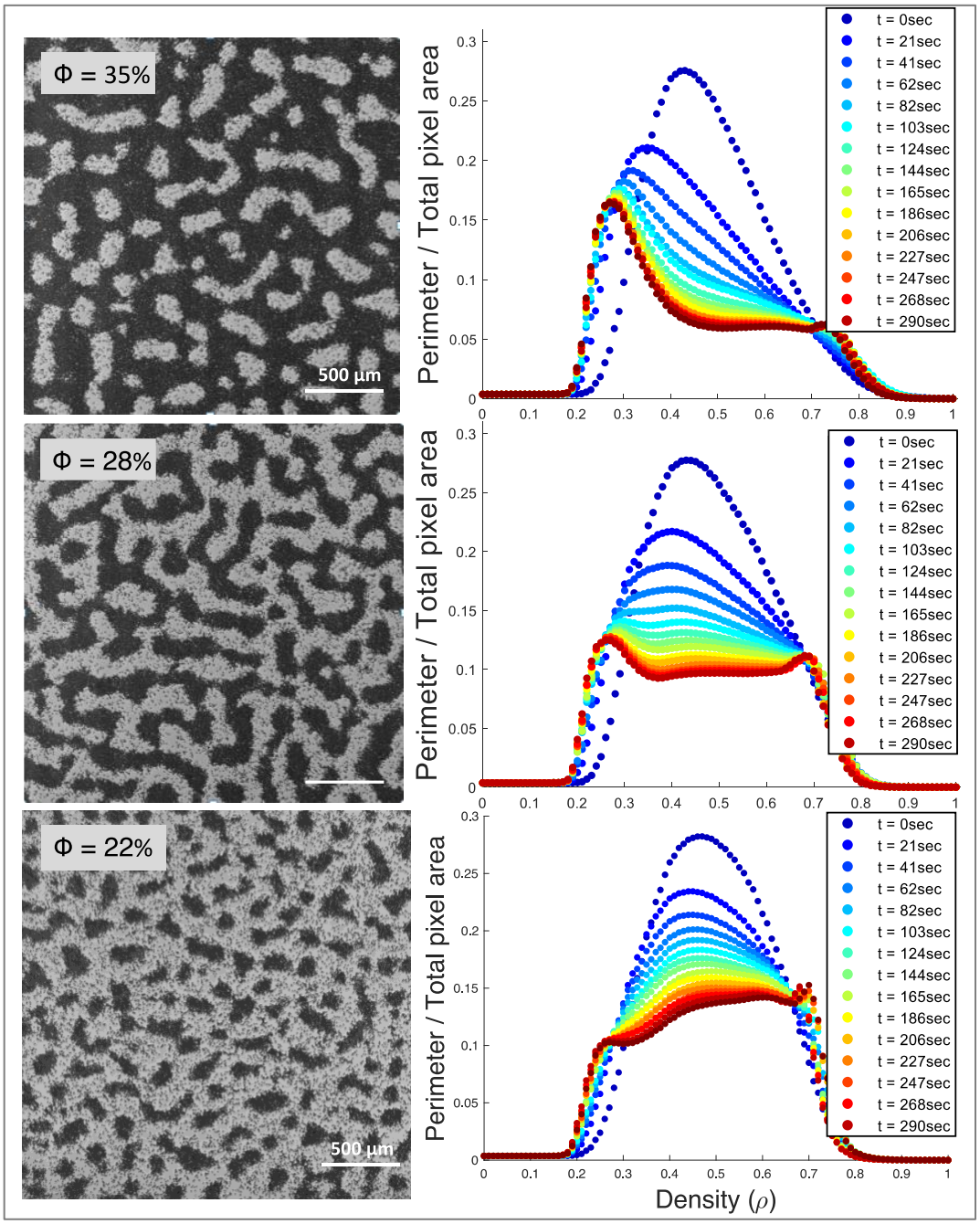
Thresholding

Most of the data found in this article relays heavily on the images taking during the experimental studies. This implies that image processing plays an important role in the collection of the Minkowski parameters. For example, the position of the light source can differ from day to day, consequently, from experiment to experiment. A dilute suspension will give a lighter shade of gray than that of a concentrated suspension. Therefore, every video requires a threshold density that can capture the phase separation process, while maintaining the same selectivity when sorting each pixel to a particle dense or a particle poor domain.

We find the proper density threshold (ρ_{th}) by using the Matlab function "greythresh", which we then use to convert the image into a binary image. For visual confirmation, we can also plot one of the Minkowski parameters at different ρ_{th} over time[1] as shown in the Supplementary Figure. Note how the initially homogenous suspension represents a bell curve that splits into two grey maximums, one below 0.5 and one above it. The threshold density becomes almost independent of time as it reaches a quasi equilibrium state.

[1] K. R. Mecke, in Statistical Physics and Spatial Statistics (Springer, 2000) pp. 111–184.



Supplementary Figure : Effect of threshold density on the Minkowski parameter P on optical images taken using a 60X objective. Note how the mean ρ_{th} increases as we decrease the particles concentration (Lighter image).