Supporting Material:

The role of the meniscus shape

in large-area convective particle assembly

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S.1 Analysis of film quality

The following figures are frames taken from video scans that we performed for quality analysis. They show the quality of the film at positions where 2.5 cm of film had been deposited.

Fig. 1 shows a film deposited at 1mm blade height and the original suspension concentration c_0 . No defects are visible and the pixel grey values exhibit a standard deviation of 1.603.

Fig. 2 shows a film deposited at a lower blade height of 100 μm and at a concentration of c_0 . Double layers and small holes cover large parts of the frame and cause an increased standard deviation of 6.828.

Fig. 3 shows a film deposited at a blade height of 1 mm a lowered concentration of 0.1 c_0 . The deposition was inherently instable and constantly fluctuated between multilayers and sub-monolayers, which causes a high standard deviation of 12.32.

Fig. 4 and 5 show the histograms of the pixel grey scale values. A longer tail towards darker pixels indicates the inhomogeneities of films deposited at low blade height and low

concentration. Although the standard deviation cannot capture all details of the films, it is a convenient estimate of the overall film quality.

Figure 1: Optical micrograph of a 500 nm polystyrene particle film deposited at a blade height of 1 mm and concentration c_0 .

Figure 2:Optical micrograph of a 500 nm polystyrene particle film deposited at a blade height of 0.1 mm and concentration c_0 .

Figure 3: Optical micrograph of 500 nm polystyrene particle film deposited at a blade height of 1 mm and a concentration of $0.1 c_0$.

Figure 4: Pixel grey value distributions determined from the images in fig. 1, 2, and 3.

Figure 5: Pixel grey value distributions determined from the images in fig. 1, 2, and 3 shown on a logarithmic scale.

S.2 Interference microscopy

Interference microscopy was analyzed by locating minima and maxima. First, an interference pattern of the meniscus was recorded in reflection mode optical microscopy under monochromatic illumination (Fig 6. (a)). The distance between interference maxima and minima was estimated from line scans obtained from the images (Fig 6. (b)). The heights were calibrated using spacers of known thickness and the shape of the meniscus was reconstructed and fit with a quadratic polynomial (Fig 6. (c)).

Figure 6. The three steps of meniscus shape reconstruction. From the image of the interference pattern (a), a line scan is taken (b). The peaks are connected with height values via the interference condition and produce a profile that is fitted with a second order polynomial (c).