Supplementary Material (ESI) for Soft Matter

Supplementary Information

Atomic force Microscopy (AFM) measurements were performed to determine the effect CO_2 bubbling on the roughness, wall thickness and general morphology of capsules containing oligoamine II. Figure 1 shows representative AFM images of (PDDA/PSS/PAH/PSS) capsules (1a) and (PDDA/$(PSS/II)_5$PAH/PSS) (1b). The dotted line corresponds to the surface profile depicted below each image. From figure 1b, one can see submicron sized aggregates that are absent in capsules that do not contain oligoamine II. Statistical measurements done over 30 capsules of each sample revealed that the average wall thickness of 5.0 ±0.4nm for 4 layers (PDDA/PSS/PAH/PSS), whereas the calculated thickness was 7.4 ±0.5nm for capsules containing II (PDDA/$(PSS/II)_5$PAH/PSS). The average roughness (Ra) was measured to be 1.1 (±0.2) and 1.8 (±0.4) for capsules lacking and containing oligoamine II, respectively. Performing a statistical t-test at 99% confidence interval supports that the roughness difference between the two samples is significant.

Figure 2 shows AFM images of capsules after bubbling nitrogen (2b) and carbon dioxide (2a) in solution for 20 minutes. Whereas saturating the capsule solution with N2 did not appear to yield any effect, exposure to CO_2 led to a decrease in capsule number as well as to the formation of debris, possibly remnants of broken capsules. The gas flow was carefully monitored and kept constant to prevent damages from occurring as a result of gas pressure. Small holes and tears were commonly observed in CO_2 treated samples.

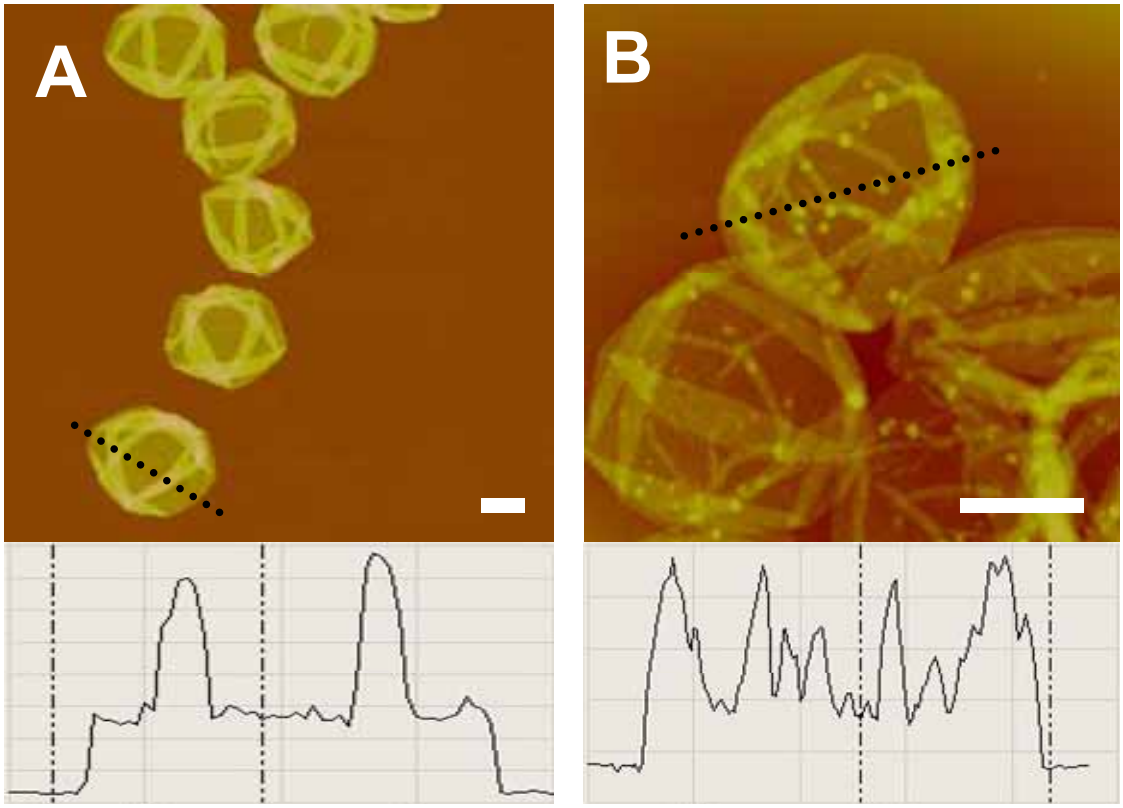

Figure 1: Atomic force Microscopy (AFM) images of (PDDA/PSS/PAH/PSS) (left) and (PDDA/(PSS/II)$_5$PAH/PSS) (right) capsules with the surface profile corresponding to the dotted line shown underneath each image. The scaling bar measures 2 µm.

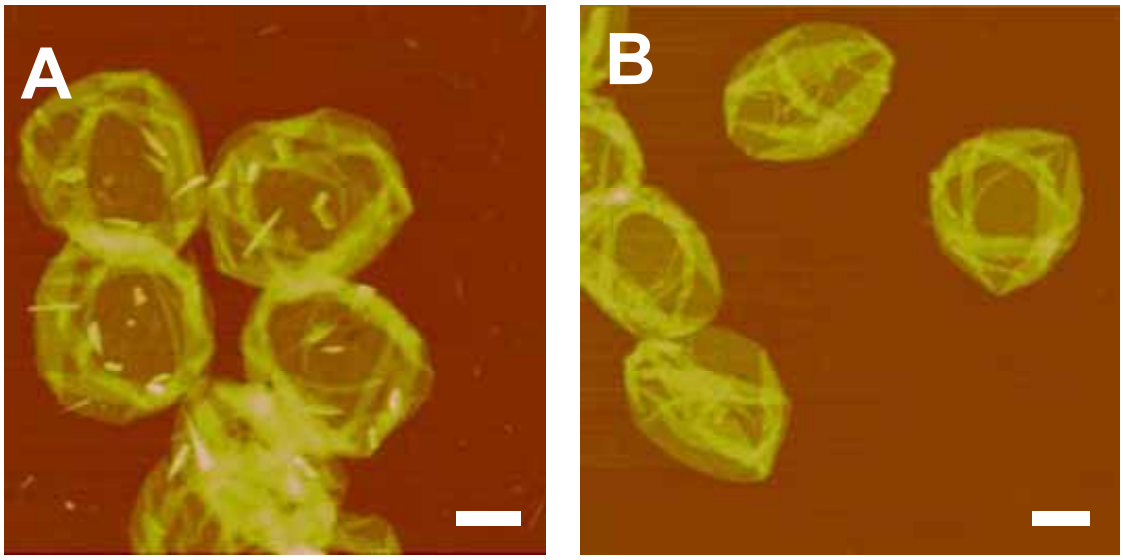

Figure 2: Atomic force Microscopy (AFM) images of (PDDA/(PSS/II)$_5$PAH/PSS) capsules after bubbling carbon dioxide (left) and nitrogen (right) in solution. The scaling bar measures 2 µm.