

Supporting Information for

**Tuning the modulus of nanostructured ionomer
films of core-shell nanoparticles based on
poly(*n*-butyl acrylate)**

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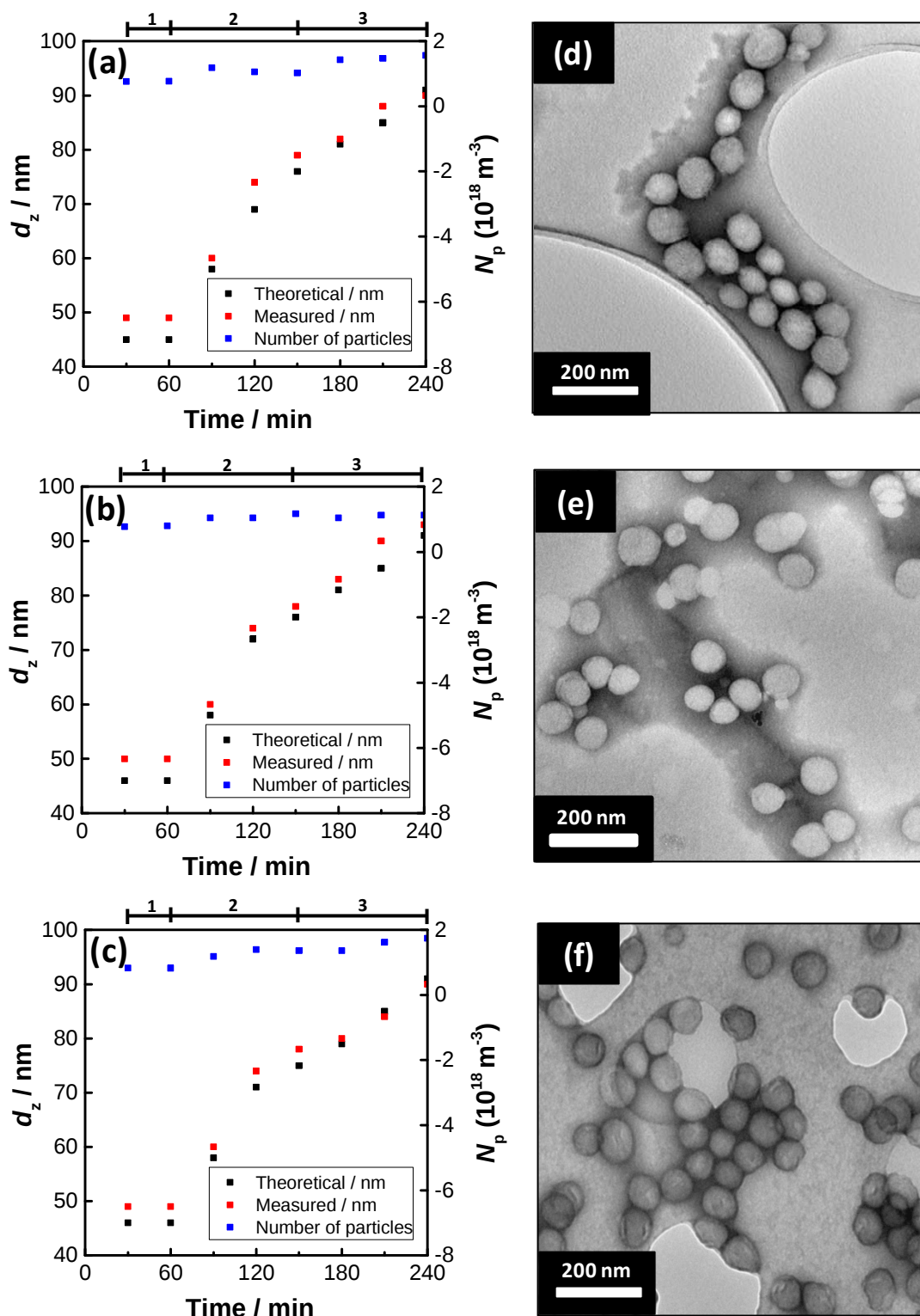


Fig. S1. (a) - (c) show measured particle diameters (red squares) during growth for C55(0)-20(1), C55(0)-23(0) and C55(0)-28(1), respectively. The theoretical diameter values (black squares) and the number-density of nanoparticles (blue squares) are also shown. The numbers at the top of the graphs show the different stages of growth (Scheme 1a). TEM images are shown for (d) C55(0)-20(1), (e) C55(0)-23(1), and (f) C55(0)-28(1).

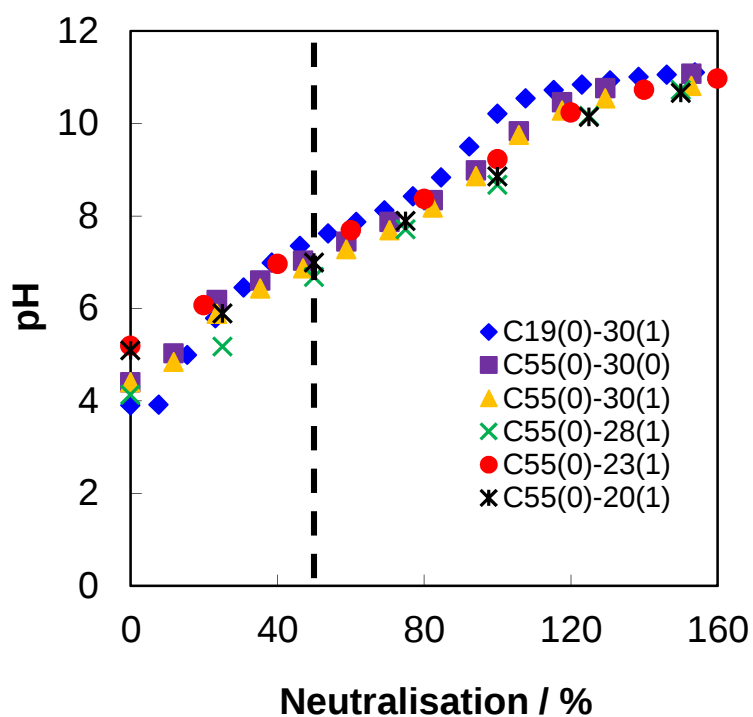


Fig. S2. pH as a function of neutralisation for various core-shell nanoparticle dispersions. The apparent pK_a values were determined from the pH values corresponding to 50% neutralisation and this point is indicated by the vertical line.

Table S1 Characterisation data for the nanoparticle films studied.

Dispersion Code	$T_{g(c)}^a / ^\circ\text{C}$	$T_{g(s)}^a / ^\circ\text{C}$	E^b / MPa	σ_b^c / MPa	$\varepsilon_b^d / \%$
C100(0)	-39	-	0.19 ± 0.05	0.10 ± 0.004	179 ± 16
C19(0)-30(1)-0n	-44	33	23.1 ± 2.50	7.41 ± 0.25	241 ± 14
C55(0)-30(1)-0n	-42	40	12.7 ± 1.10	3.34 ± 0.29	202 ± 6
C55(0)-28(1)-0n	-40	40	8.38 ± 0.62	3.25 ± 0.18	237 ± 18
C55(0)-23(1)-0n	-40	27	1.40 ± 0.29	2.86 ± 0.16	434 ± 12
C55(0)-20(1)-0n	-44	24	1.04 ± 0.12	2.31 ± 0.17	445 ± 7
C19(0)-30(1)-50n	-45	38	52.5 ± 21.3	9.56 ± 0.88	203 ± 7
C55(0)-30(1)-50n	-42	46	29.7 ± 1.88	7.20 ± 0.29	233 ± 8
C55(0)-28(1)-50n	-46	41	27.6 ± 5.38	6.13 ± 0.75	254 ± 23
C55(0)-23(1)-50n	-40	28	3.21 ± 0.22	3.56 ± 0.90	309 ± 24
C55(0)-20(1)-50n	-42	26	1.90 ± 0.21	3.18 ± 0.23	336 ± 7
C19(0)-30(1)-100n	-41	39	85.5 ± 11.8	9.90 ± 1.29	182 ± 16
C55(0)-30(1)-100n	-40	46	41.0 ± 7.2	8.22 ± 0.33	221 ± 14
C55(0)-28(1)-100n	-44	40	37.7 ± 8.7	6.49 ± 0.40	233 ± 15
C55(0)-23(1)-100n	-40	29	11.7 ± 0.9	4.22 ± 0.07	289 ± 15
C55(0)-20(1)-100n	-42	26	8.07 ± 1.78	4.54 ± 0.21	328 ± 27

^a $T_{g(c)}$ and $T_{g(s)}$ are the glass transition temperatures assigned to the polymer from the core and shells of the nanoparticles, respectively, determined from the $\tan \delta$ maxima (See text). ^b Young's modulus.

^c Stress-at-break. ^d Strain-at-break.