Supplementary Material (ESI) for Soft Matter

Electronic Supplementary Information

Systematic approach to electrostatically induced 2D crystallization of nanoparticles at liquid interfaces

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Isoelectric Point of CPMV. The isoelectric point of CPMV was determined through zeta potential (ζ) measurements on CPMV in 10 mM MES solutions at various pH (± 0.1). The concentration of CPMV used was 0.015 mg/mL, the same as in the GISAXS measurements. A Zetasizer light scattering set-up (Malvern corporation) was used to measure the electrophoretic mobility (μ_e) of CPMV in aqueous solutions. The zeta potential was then calculated by using the Smoluchowski formula,[1] $\zeta = \eta\mu_e/\varepsilon\,\varepsilon_0$, where η is the viscosity of water, ε is the dielectric constant for water, and ε_0 is the permittivity for vacuum. The data plotted in Fig. S1 show that the isoelectric point is pI = 4.3 ± 0.1, corresponding to the pH value at which $\zeta = 0$. This pI value is within the previously reported range of pI = 3.7-4.5 for CPMV.[2]

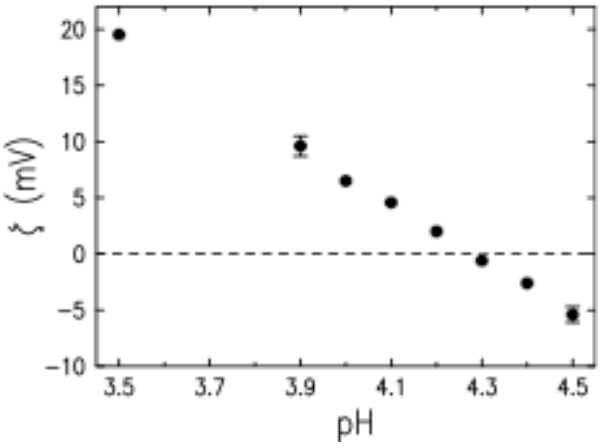

Fig. S1. Measured zeta potential (ζ) for CPMV in 10 mM MES solutions as a function of pH.

Ionic Strength of Aqueous Solutions. Figure S2 shows estimated ionic strength of the 10 mM MES solutions as a function of pH. The calculation takes into account the amount of NaOH or HCl required to achieve the desired pH and the pH dependence of the extent to which MES dissociates as a monovalent anion. With pK_a = 6.15 for MES, the ratio of dissociated to undissociated MES at a given pH is given by 10^{pH-pKa}.

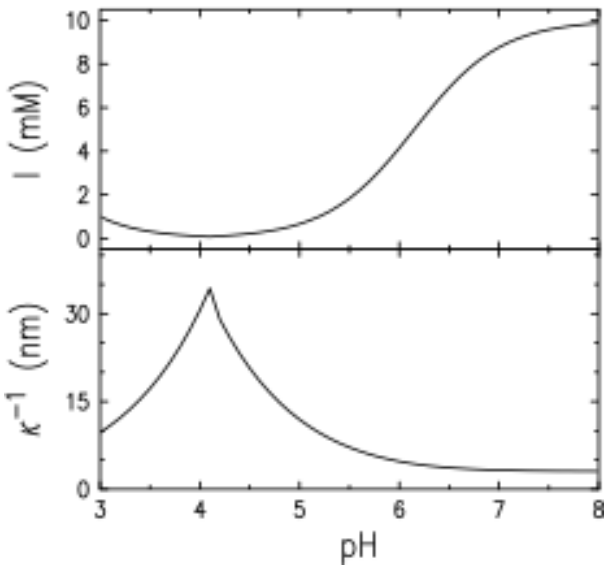

Fig. S2. Estimated ionic strength (top) and the corresponding Debye screening length (bottom) for the 10 mM MES solutions as a function of pH.

References

1. A. Delgado, F. Gonzalez-Caballero and J. M. Bruque, *Colloid Polym. Sci.*, 1986, **264**, 435-438.
2. A. van Kammen, J. van Lent and J. Wellink, *CMI/AAB Description of Plant Viruses*, 2001, **378**.