Electronic Supplementary Material (ESI) for Soft Matter

Supplementary Information

Mechanistic Insights into Phosphatase Triggered Self-Assembly Including Enhancement of Biocatalytic Conversion Rate

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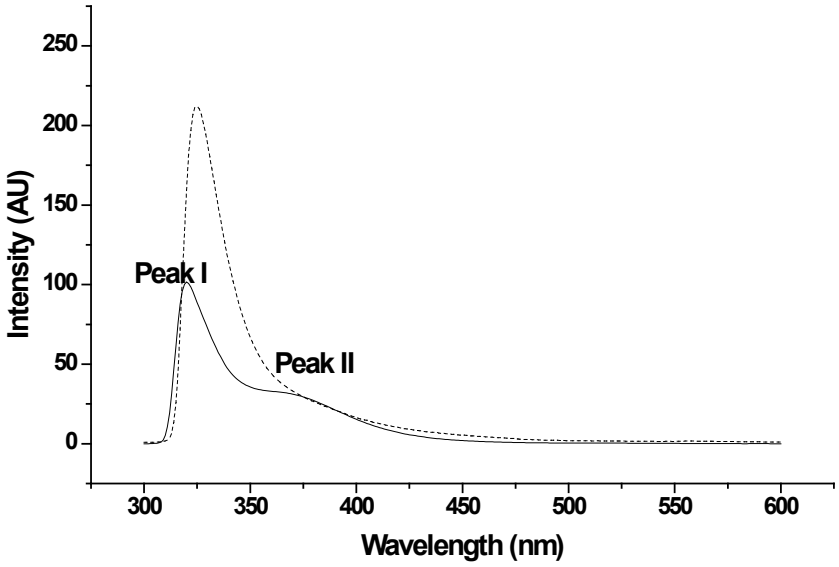

Figure S1. The fluorescence emission spectra after λ_{exc} 295 nm of the solution of Fmoc-*p*Y (40mM solid black line) and the hydrogels of Fmoc-Y-OH formed by AP trigger at 3.3 x 10^{-2} mgs protein (also 40 mM dotted line) with the individual peaks labelled.

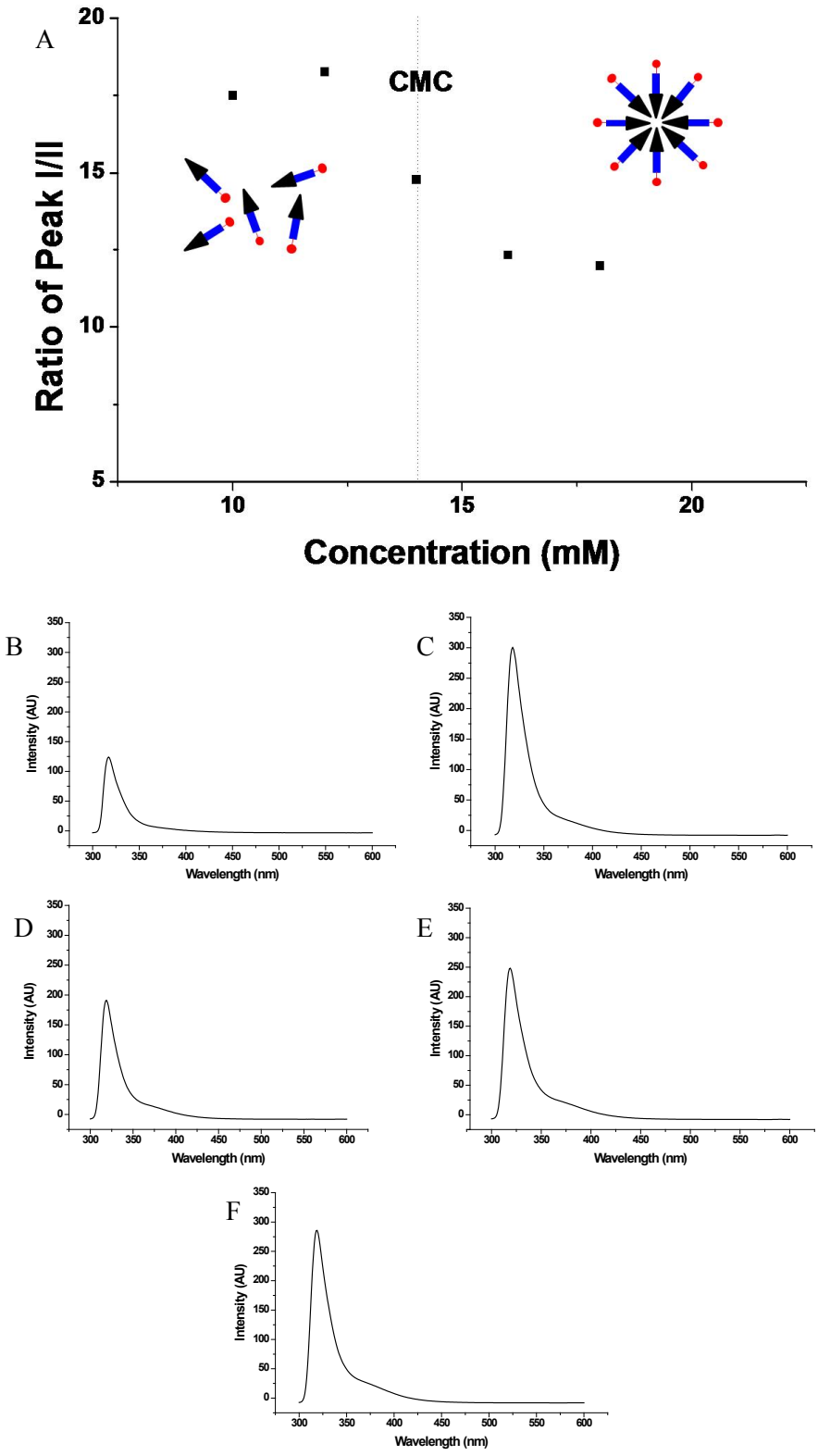

Figure S2. Critical Micelle Concentration (CMC) of Fmoc-*p*Y with a proposed micelle structure (A). The CMC was determined through the ratio of Peaks I:III (320 and 375 nm respectively) detected through fluorescence spectroscopy after λ_{exc} at 295 nm for a range of Fmoc-*p*Y solutions – 10 mM (B), 12 mM (C), 14 mM (D), 16 mM (E) and 18 mM (F). The results suggest a CMC of 14 mM.

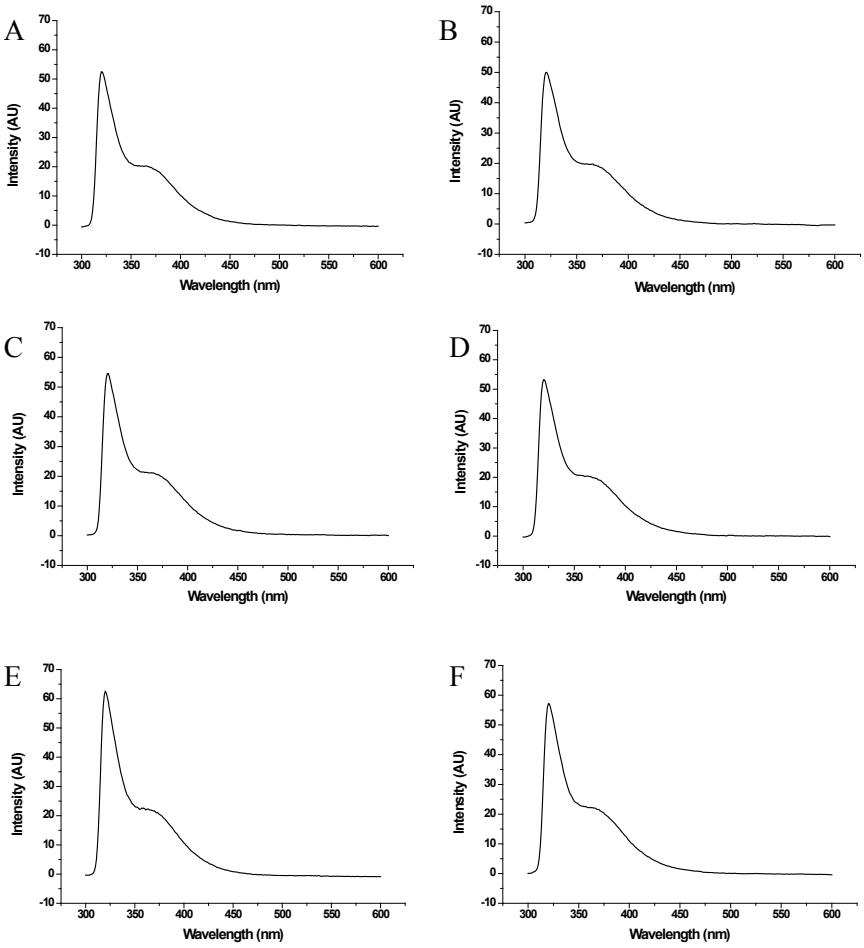

Figure S3. The individual fluorescence spectra of Fmoc-*p*Y (40mM) without AP addition to demonstrate no significant changes were observed in this solution (λexc = 295 nm). To ensure similarities in concentration an equivalent volume of phosphate buffer was added at T = 0 (A) and regular readings were taken after this. The graphs shown here are after 10 mins (B), 30 mins (C), 1 hour (D), 2 hours (E) and 4 hours (F).

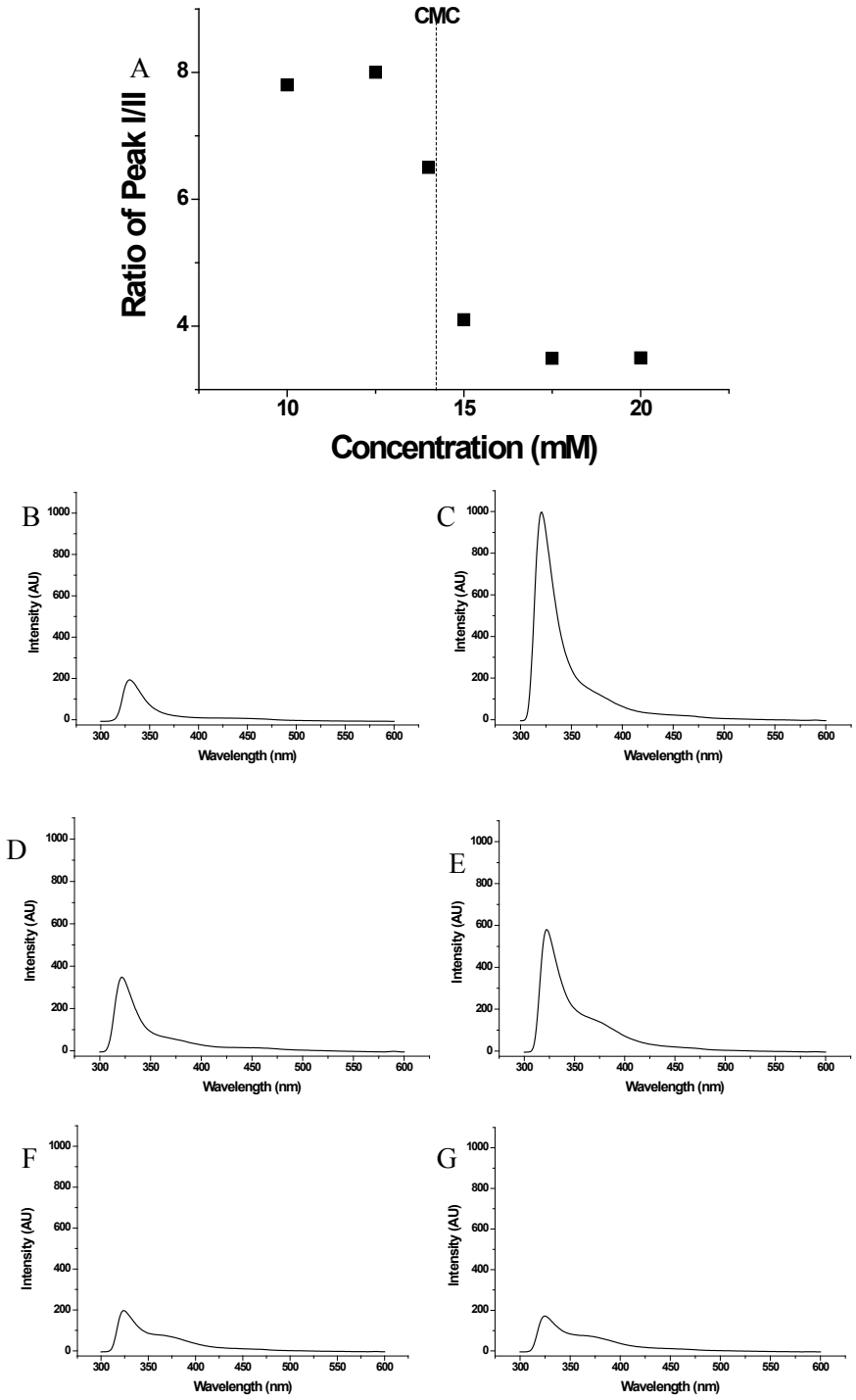

Figure S4. Critical Micelle Concentration (CMC) of Fmoc-Y (A). The CMC was determined through the ratio of Peaks II:III (325 and 375 nm respectively(detected through fluorescence spectroscopy after λ_{exc} at 295 nm for a range of Fmoc-Y solutions – 10mM (B), 12.5 mM (C), 13.5 mM (D), 15 mM (E), 17.5 mM (F) and 20 mM (G), suggesting a CMC of 14 mM.

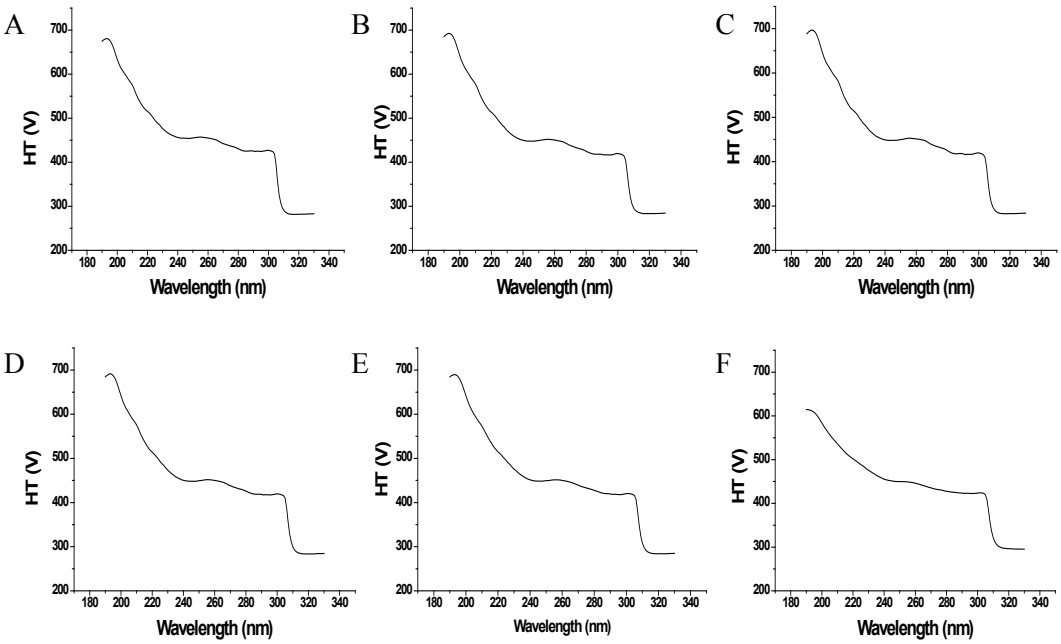

Figure S5. The average photomultiplier tube (PMT) voltage while gathering the CD spectra of the AP triggered (at 3.3 x 10^{-2} mgs protein) hydrogels of Fmoc-Y over time given in Figure 5-6. Time points: A – 0 mins, B – 10 mins, C – 30 mins, D – 60 mins, E – 120 mins and F – 240 mins. When the current voltage exceeds 500 the data obtained at wavelengths less than this are unreliable due to high signal to noise ratio.

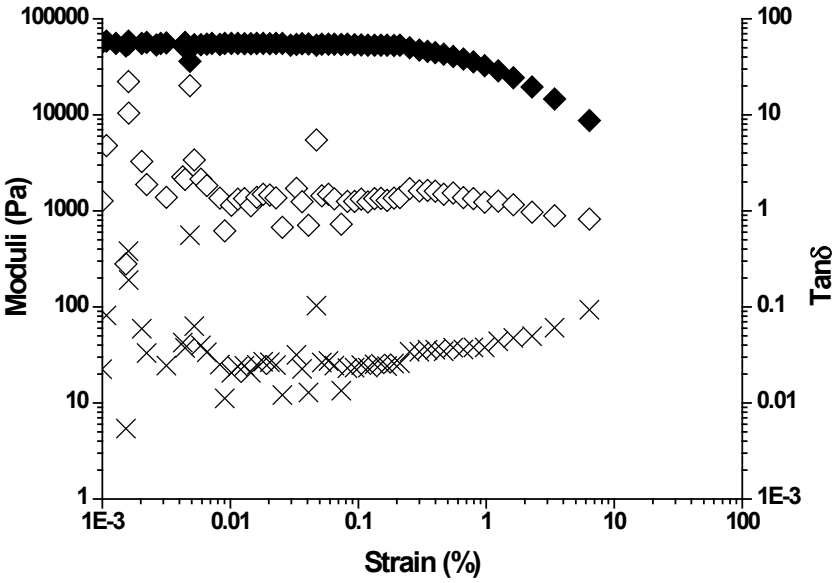

Figure S6. Amplitude sweep completed after the timed oscillatory rheology study to prove that the strain chosen for the timed study (0.1%) was within the linear viscoelastic region of the hydrogels formed. Therefore all the changes in the mechanical properties are a result of gelation and fibre formation.

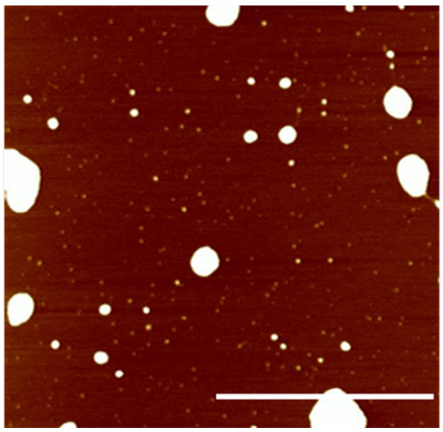

Figure S7. Alkaline phosphatase at 0.11 mgs protein in phosphate buffer (0.6M) on mica, chosen over glass for its regular topography. The larger aggregates are believed to be salt crystals. The smaller particles are believed to be alkaline phosphatase with an average width of 29 ± 24 nm and an average height of 6.0 ± 5.4 nm (n = 30).