Electronic Supplementary Material (ESI) for Nanoscale.

Supporting information

Peptide-mediated porphyrin based hierarchical complexes for light-to-chemical conversion

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Supporting Figures

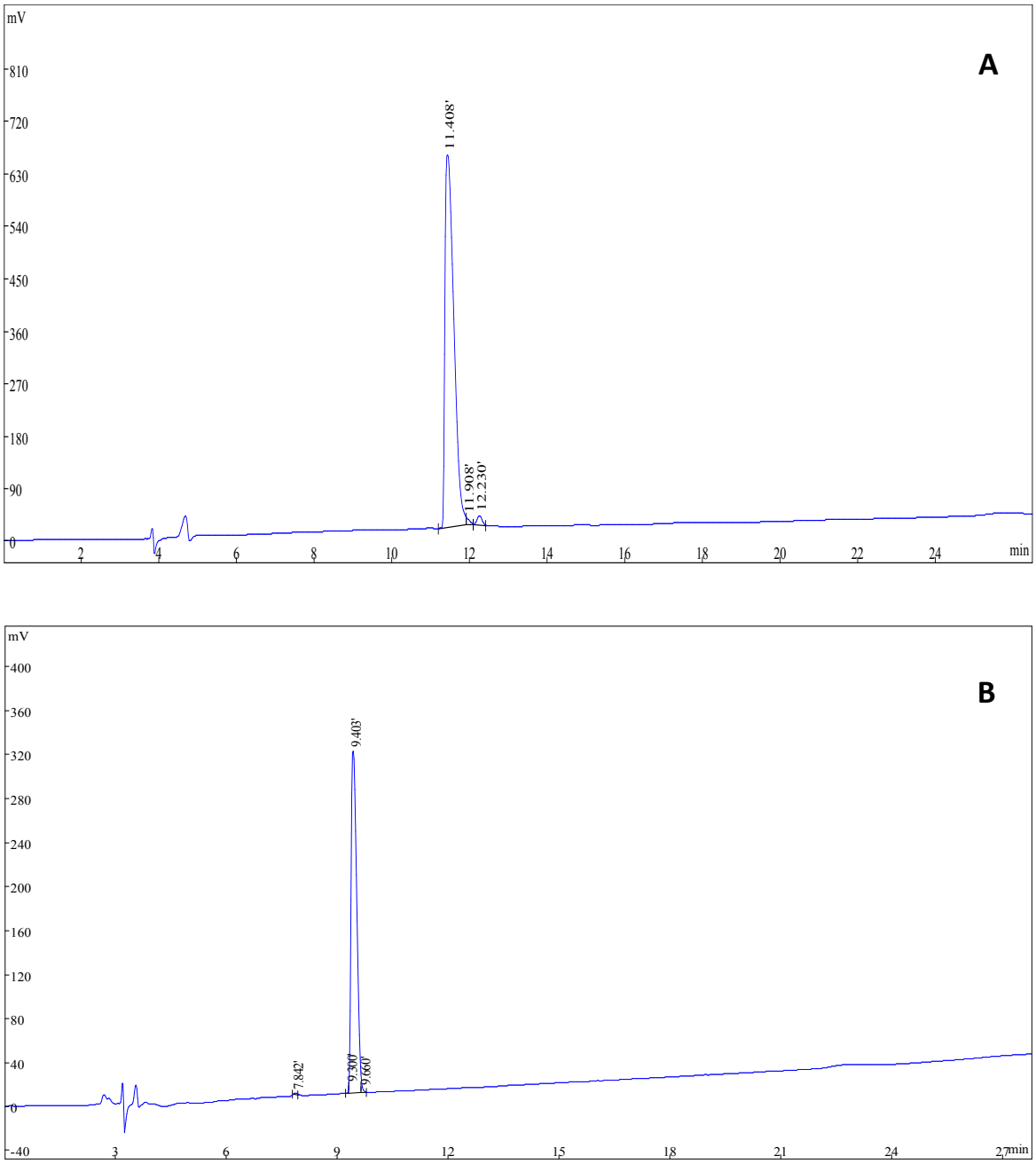

Fig. S1. (A) HPLC profiles of ChaChaGK. The experimental condition for the HPLC analysis is as follows: eluent A, 0.1% TFA in acetonitrile, 0→30 min, 30%→55%, 25.1→30 min, 100%; eluent B, 0.1% TFA in water, 0→25 min, 70%→45% 25.1→30 min, 0%. (B) HPLC profiles of FFGK. The experimental condition for the HPLC analysis is as follows: eluent A, 0.1% TFA in acetonitrile, 0→25 min, 23%→48%, 25.1→30 min, 100%; eluent B, 0.1% TFA in water, 0→25 min, 77%→52% 25.1→30 min, 0%. For both peptides, UV, 220 nm; flow rate, 1 mL min^{-1}; column, COSMOSIL, 4.6*250mm, 5um, 100A, Agela. The measurements were performed at 25 ^{o}C. The profiles indicate high purity (>98%) with the two peptides.

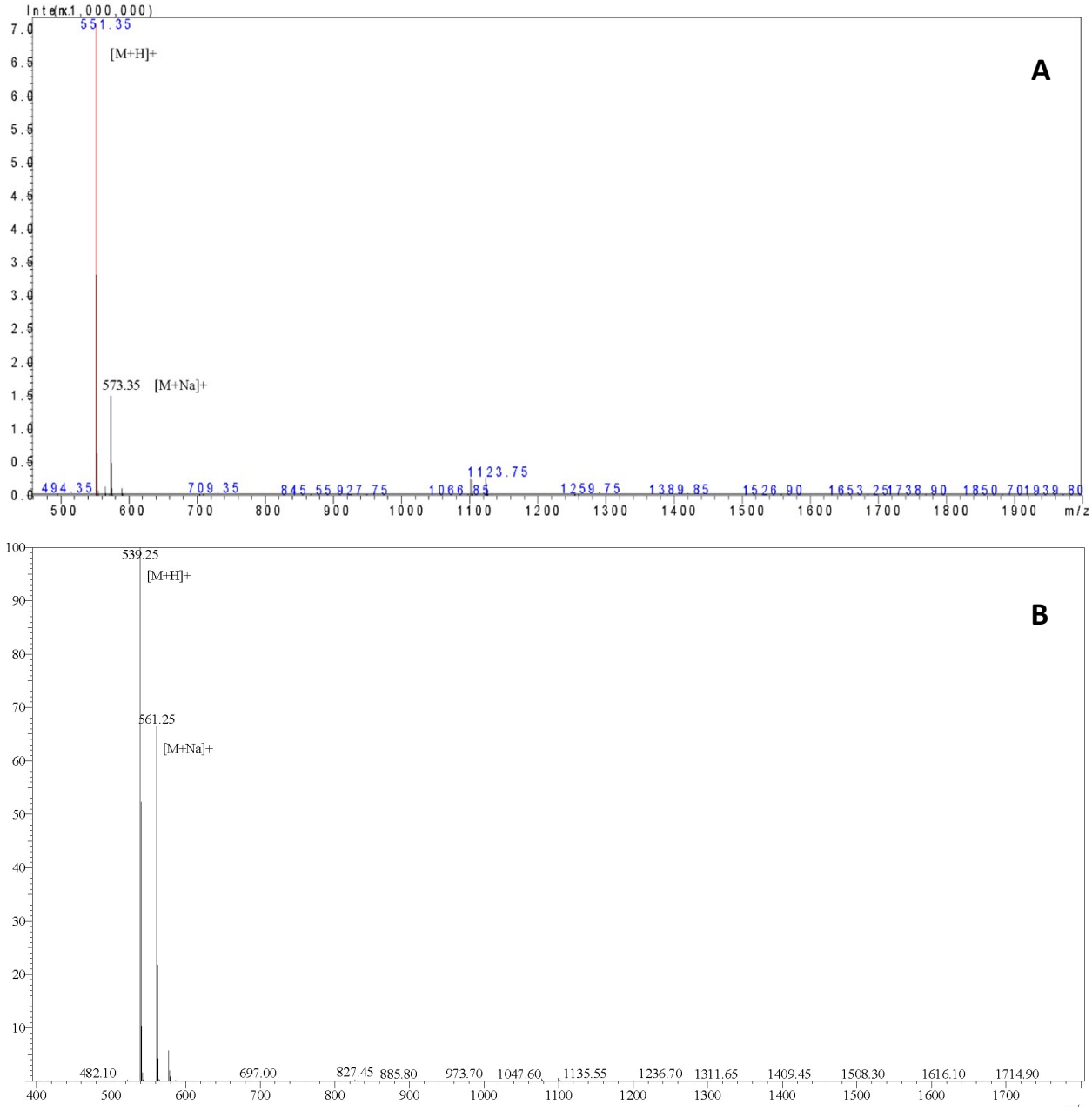

Fig. S2. MS spectra of ChaChaGK (A) and FFGK (B). The spectra indicated only objective peptides were obtained.

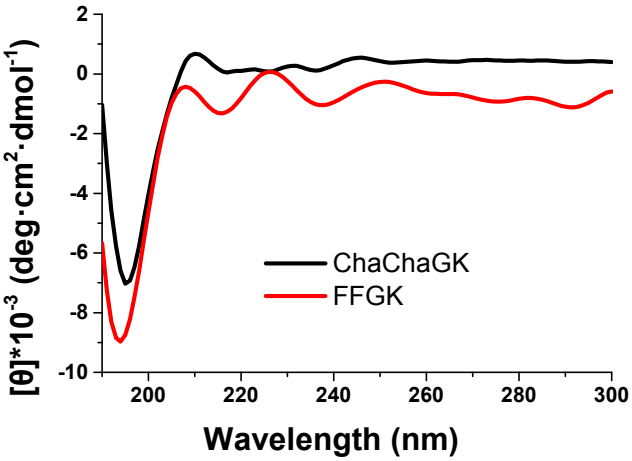

Fig. S3. CD spectra of ChaChaGK and FFGK in aqueous solution indicating coil and β-sheets second structures co-exist in the system. It needs noting that the concentration of ChaChaGK and FFGK was 16 mM and 8 mM, respectively. The solution pH is constant at pH 3.0.

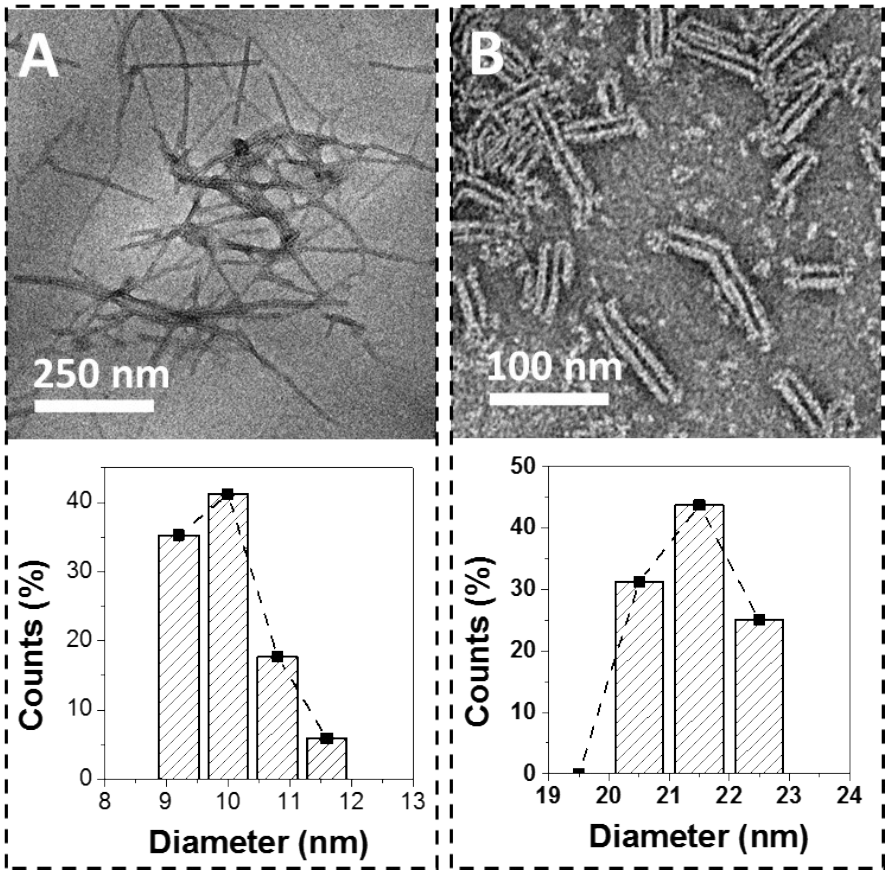

Fig. S4. TEM images of FFGK (A) and ChaChaGK (B) self-assemblies. The concentration of FFGK and ChaChaGK was 8 and 16 mM, respectively, and solution pH was constant at 3.0.

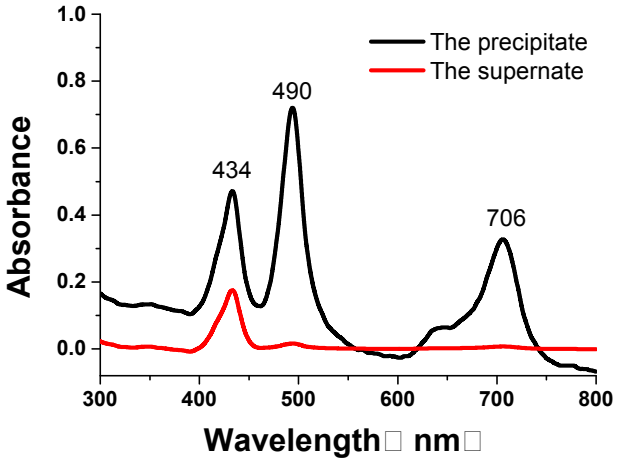

Fig. S5. UV-vis spectra of the precipitates and the supernate separated from the ChaChaGK/TPPS solution prepared from 16 mM of ChaChaGK and 50 μM of TPPS.

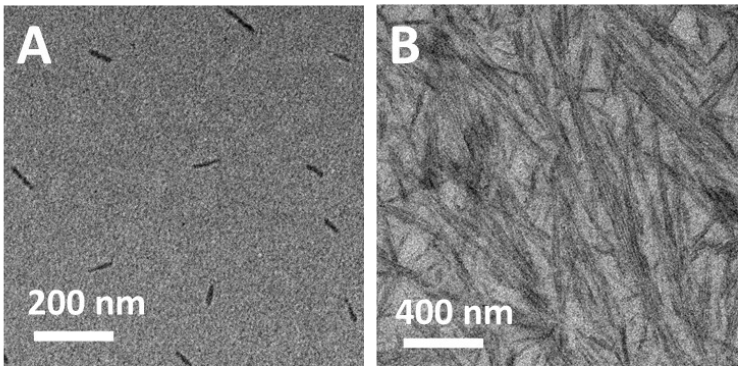

Fig. S6. TEM images of ChaChaGK/TPPS (A) and FFGK/TPPS (B) co-aggregates. It needs noting that the concentration of ChaChaGK and FFGK was 16 mM and 8 mM, respectively, while the concentration of TPPS is constant at 50 μM.

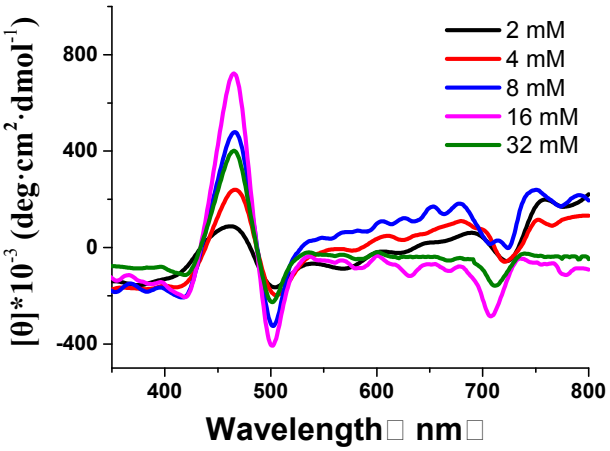

Fig. S7. CD spectra of ChaChaGK/TPPS co-aggregates prepared from a constant TPPS concentration (50 µM) with variable peptide concentrations.

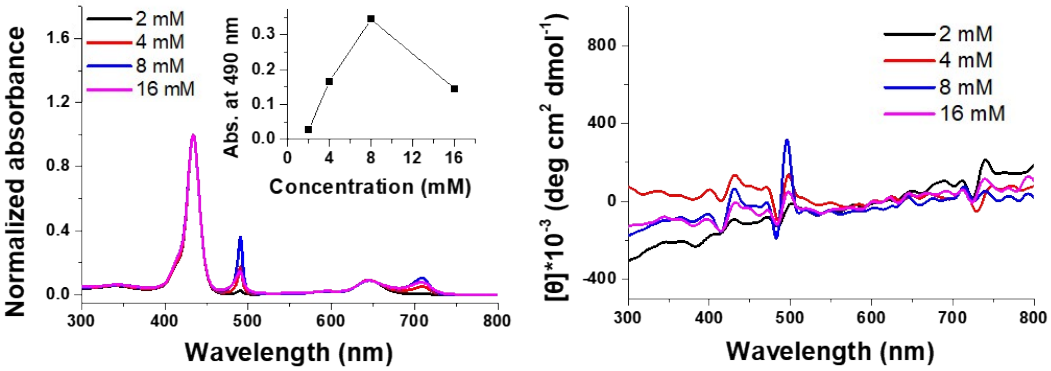

Fig. S8. UV-vis and CD spectra of FFGK/TPPS co-aggregates prepared from a fixed TPPS concentration (50 µM) with variable peptide concentrations. Inset in panel A showing UV-vis absorption intensity at 490 nm of the co-aggregates prepared from various FFGK concentrations.

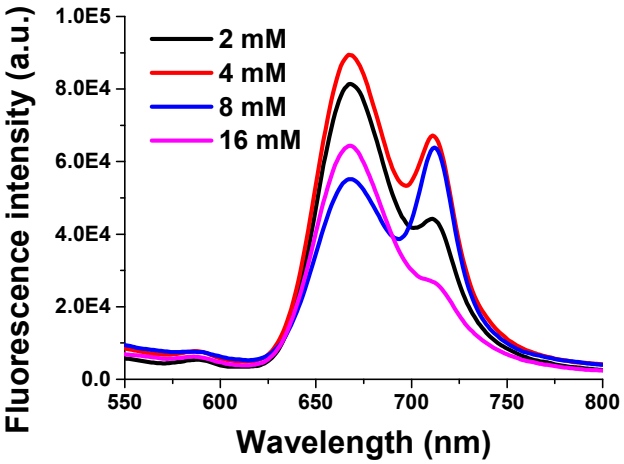

Fig. S9. Fluorescence emission spectra (λ_{exc} = 490 nm) of FFGK/TPPS co-aggregates prepared from a fixed TPPS concentration (50 μM) with variable peptide concentrations. Slight decrease in fluorescence intensity suggested that only a small quantity of TPPS dianions transformed into J-aggregates.

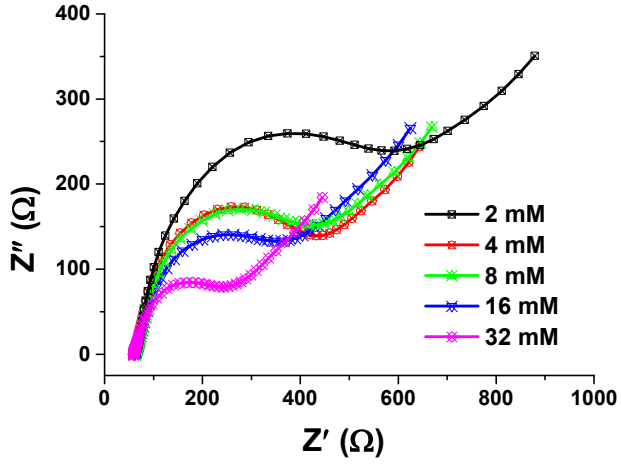

Fig. S10. Electrochemical impedance spectra (EIS) of ChaChaGK/TPPS/ITO electrodes with different concentration of ChaChaGK in 0.1 M KCl electrolyte containing 0.5 wt% $K_3(CN)_6Fe$ as a redox mediator. It needs noting that the data were collected in light irradiation.

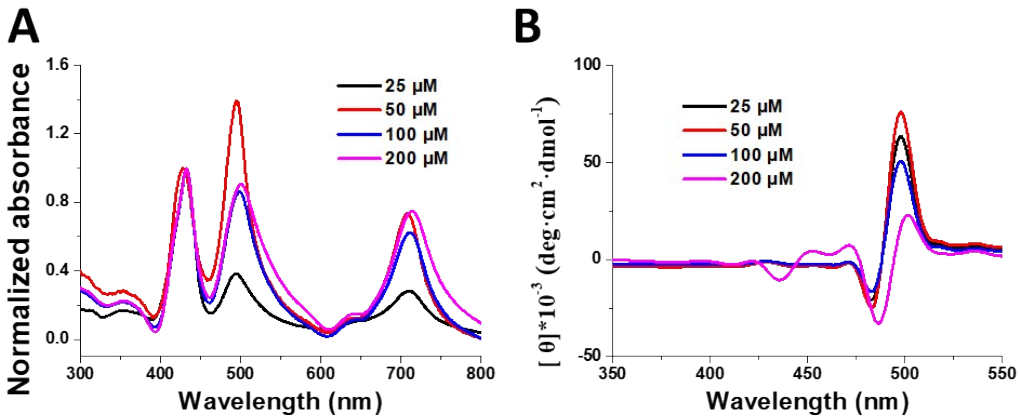

Fig. S11. Normalized UV-vis (A) and CD (B) spectra of ChaChaGK/TPPS co-aggregates prepared from a fixed peptide concentration (16 mM) with variable TPPS concentrations. It can be found that the content of J-aggregates reached a maximum when TPPS concentration was 50 μM.

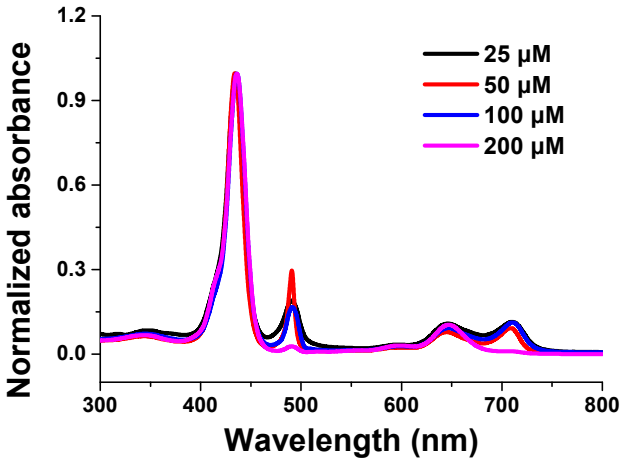

Fig. S12. Normalized UV-vis spectra of FFGK/TPPS co-aggregates prepared from a fixed peptide concentration (8 mM) with variable TPPS concentrations.

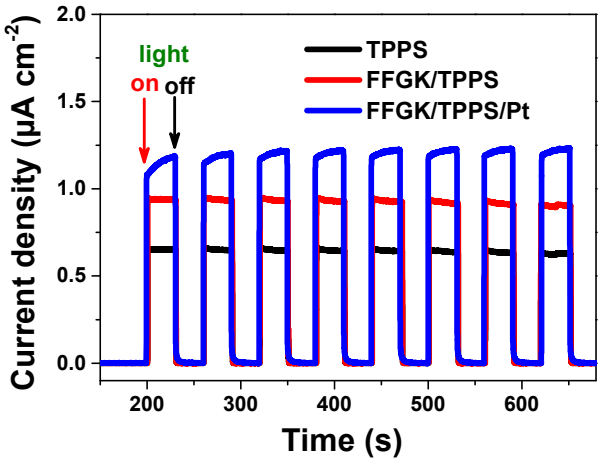

Fig. S13. i-t curves of TPPS, FFGK/TPPS and FFGK/TPPS/Pt. It needs noting that the concentration of TPPS is 50 μM for all the samples, and the concentration of FFGK is constant at 8 mM in FFGK/TPPS and FFGK/TPPS/Pt.

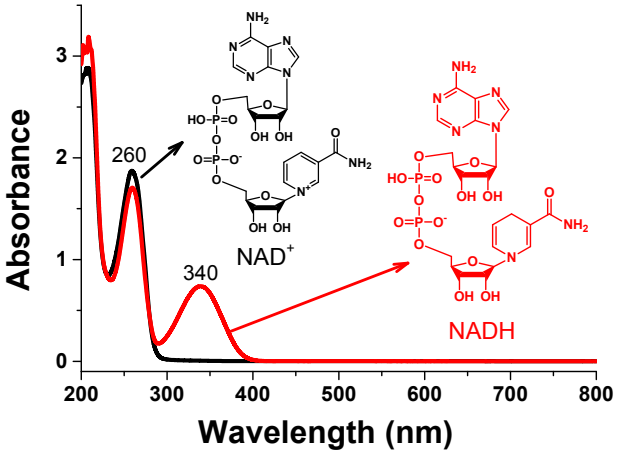

Fig. S14. Chemical structures and UV-vis spectra of NAD^+ (black) and NADH (red). Absorption band at 340 nm was used to evaluate the generation of NADH.