Electronic Supplementary Material (ESI) for ChemComm.

Supporting Information

Adenine selected hydrogelation of vitamin B2 with amplified circularly polarized luminescence

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Materials

All chemicals were purchased commercially and used without further purification. Riboflavin (Vitamin B2) was provided by J&K (>98% pure). Adenine (>99% pure), Thymine (>98% pure), Guanine (>98% pure) and Cytosine (>98% pure) were supplied by TCI. Uracil (>99% pure) was obtained from Alfa Aesar. The water used in all experiments was of Millipore Milli-Q grade (18.2 MΩ cm).

Characterization

Scanning electron microscopy (SEM) was carried out on a Hitachi S-4800 FE-SEM microscope under an accelerating voltage of 10 kV. Before SEM measurements, the samples on silicon wafers were coated with a thin layer of Pt to increase the contrast. X-ray diffraction (XRD) patterns were achieved on a Rigaku D/Max-2500 X-ray diffractometer (Japan) with CuKa radiation (λ = 1.5406 Å), which were operated at a voltage of 45 kV and a current of 100 mA. Samples were cast on silicon substrates and dried under vacuum for XRD measurements. Fourier transform infrared (FT-IR) spectra were recorded with a JASCOFT/IR-660 Plus spectrophotometer at room temperature. UV-Vis absorption spectra were measured with a Hitachi U-3900 Spectrophotometer and Circular dichroism (CD) spectra were recorded in a JASCO J-1500 spectropolarimeter. The fluorescence emission spectra were operated on a Hitachi F-4600 instrument with excitation voltage of 400 V. The CPL spectra were performed on a JASCO CPL-200 spectrometer.

Preparation of the Hydrogels

All the hybrid hydrogels were prepared in a closed glass vial. A certain percentage of Vitamin B2 powder (with certain concentration) and the five nucleobases (A ,T ,G , C and U) were put into the corresponding marked sample bottle, respectively, 1 mL water was required to keep the concentration of Vitamin B2 at 1.3×10^{-2} M. Then the mixture was heated until a transparent solution was appeared. Then the solution was spontaneously cooled at 6°C. Only adenine (A) could co-assembly into hydrogel with Vitamin B2, as estimated by an inversion test (the solution did not flow when the test tube was inverted). While precipitates were obtained in other systems with the same experimental procedure.

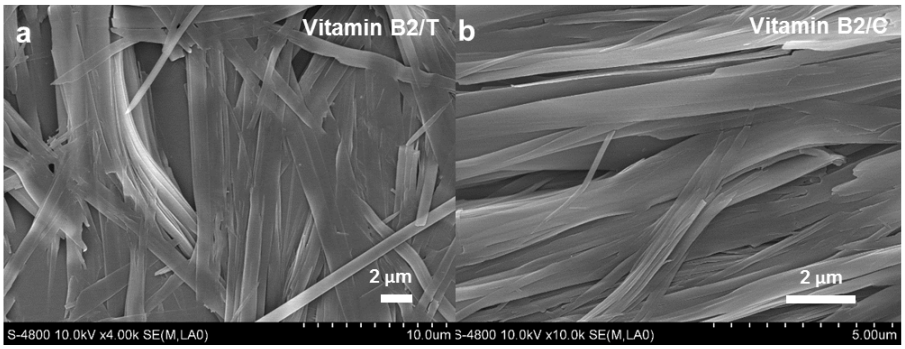

Fig. S1 SEM images of the co-assemblies of vitamin B2 with (a) T and (b) C in a molar ratio of 1:2.

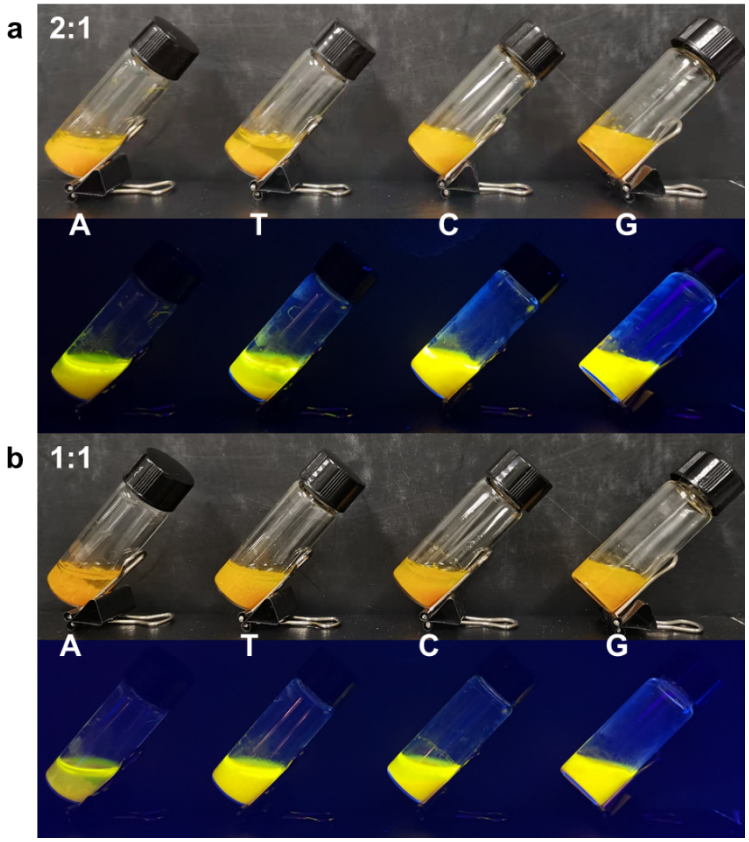

Fig. S2 Photographs of vitamin B2 with different nucleobases in water with different molar ratios under visible light and 365 nm UV light. (a) 2:1, (b) 1:1.

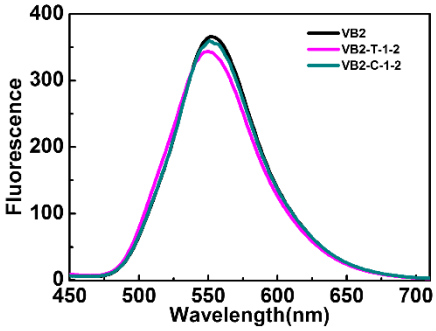

Fig. S3 FL spectra of vitamin B2, vitamin B2/T and vitamin B2/C with a molar ratio of 1:2.

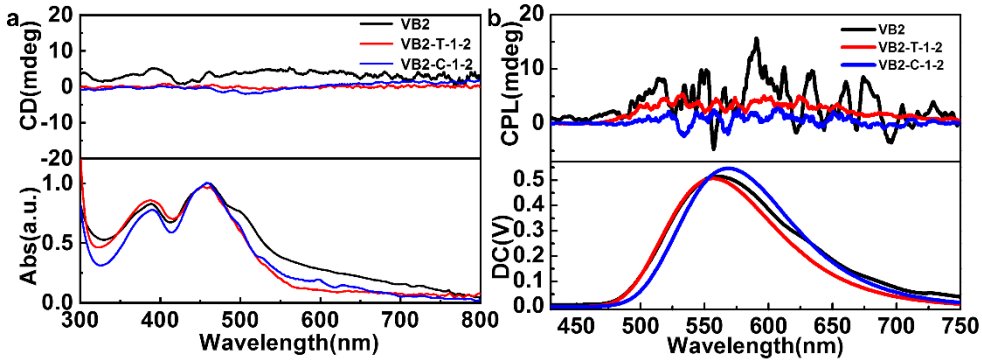

Fig. S4 (a) CD spectra and (b) CPL spectra of vitamin B2, vitamin B2/A and vitamin B2/G with a molar ratio of 1:2.

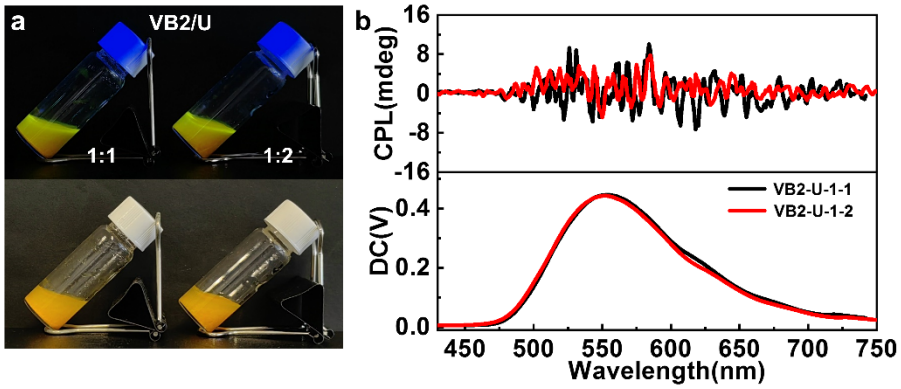

Fig. S5 (a) Photographs of vitamin B2 and uracil (U) with different molar ratios under visible light and 365 nm UV light, (b) CPL spectra of vitamin B2 with various concentrations of U.

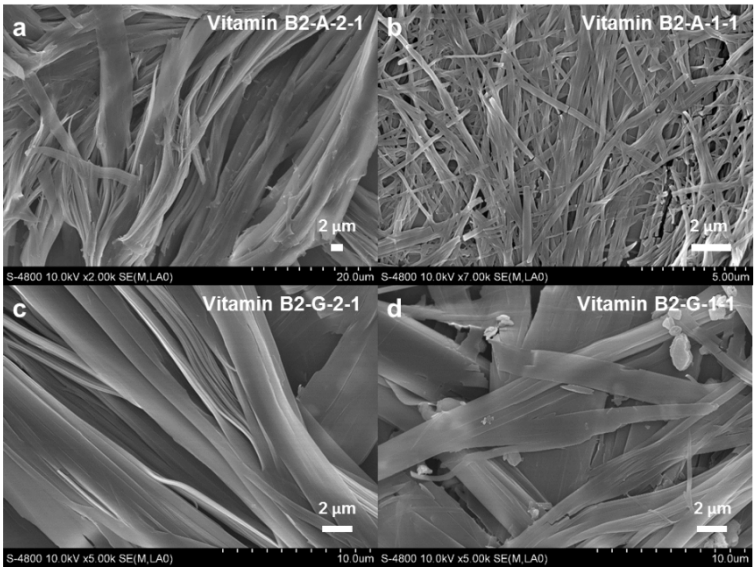

Fig. S6 SEM images of the co-assemblies of vitamin B2 with different nucleobases. (a) vitamin B2/A = 2:1, (b) vitamin B2/A = 1:1, (c) vitamin B2/G = 2:1, and (d) vitamin B2/G = 1:1 (molar ratio).

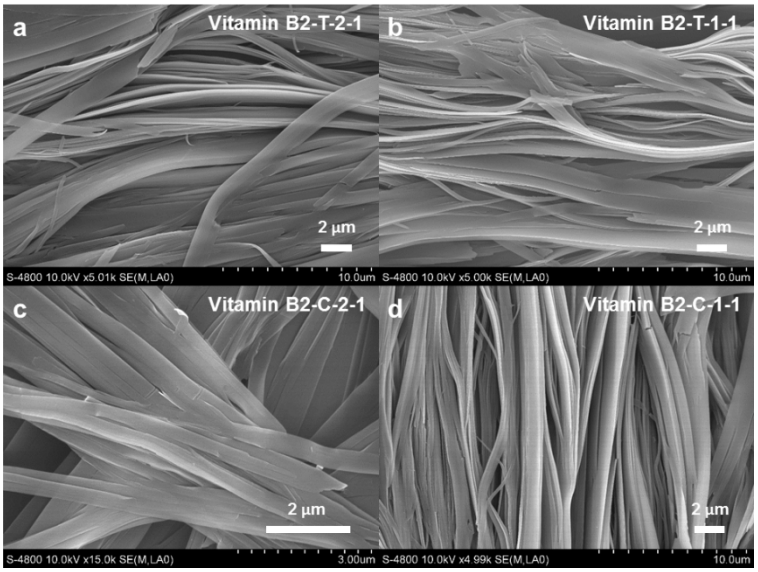

Fig. S7 SEM images of the co-assemblies of vitamin B2 with different nucleobases. (a) vitamin B2/T = 2:1, (b) vitamin B2/T = 1:1, (c) vitamin B2/C = 2:1, and (d) vitamin B2/C = 1:1 (molar ratio).

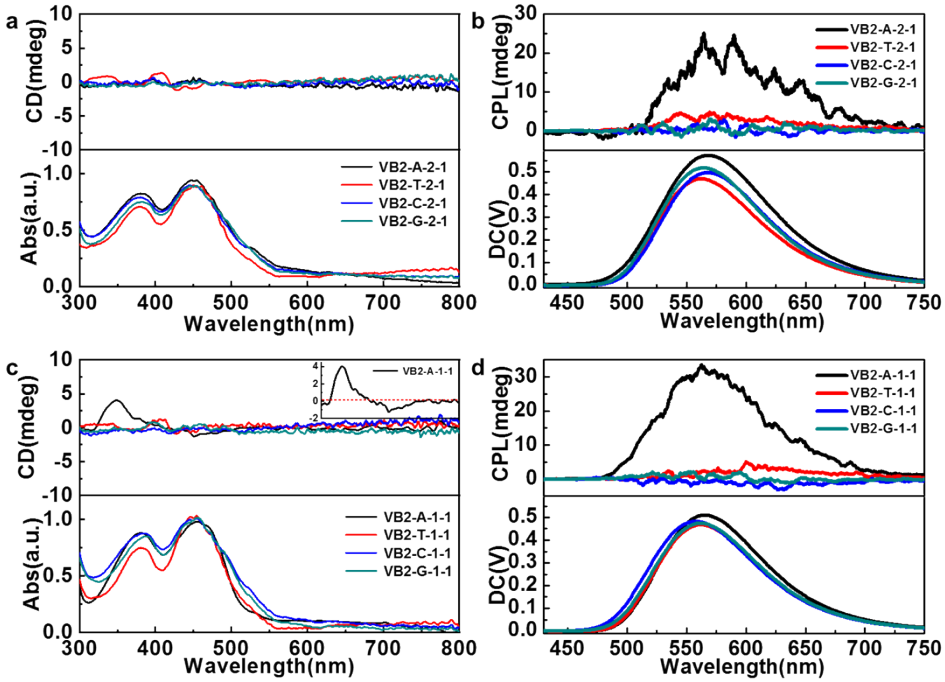

Fig. S8 (a) CD spectra and (b) CPL spectra of vitamin B2/A, vitamin B2/T, vitamin B2/C and vitamin B2/G with a molar ratio of 2:1. (c) CD spectra and (d) CPL spectra of vitamin B2/A, vitamin B2/T, vitamin B2/C and vitamin B2/G with a molar ratio of 1:1.

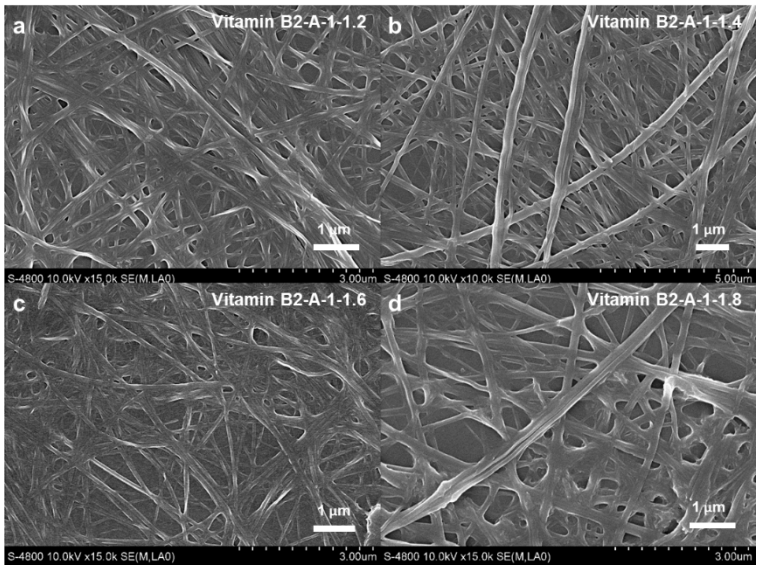

Fig. S9 SEM images of the co-assemblies of vitamin B2/A with different molar ratios. (a) 1:1.2, (b) 1:1.4, (c) 1:1.6 and (d) 1:1.8.