

Supporting Information

A Reversible Functionalized Supramolecular Materials Formed by Host-Guest Inclusion

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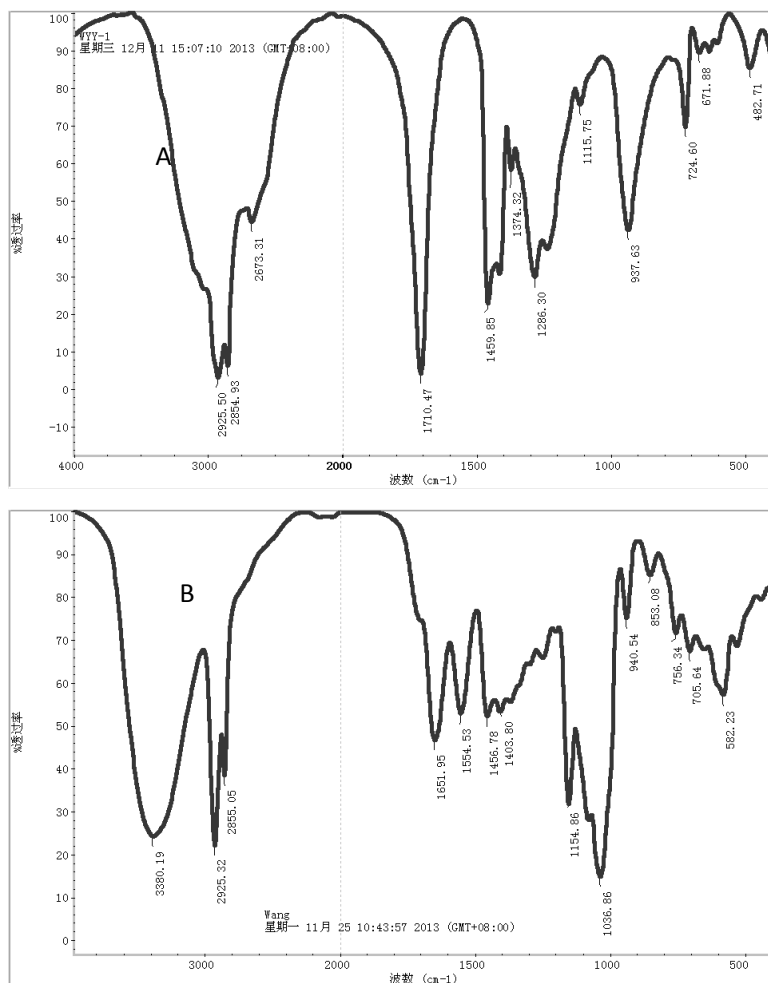


Figure S1. IR spectra of 6-Amino-βCD (A) and Em-βCD (B).

Figure S1 showed the IR spectra of 6-amino-βCD and Em-βCD. The characteristic peaks of secondary amide appeared at 1652 and 1555 cm⁻¹ in the spectrum of Em-βCD, indicating the formation of Em-βCD.

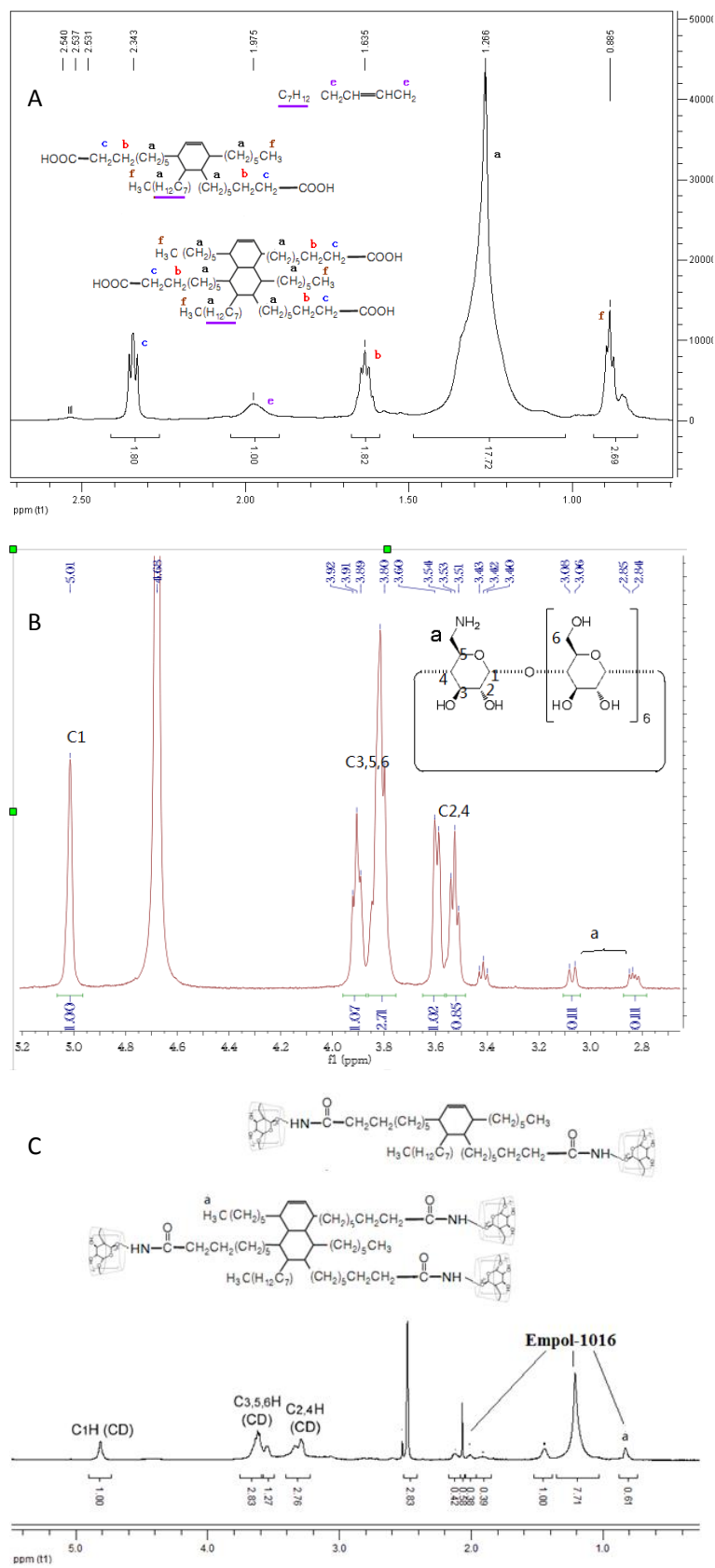
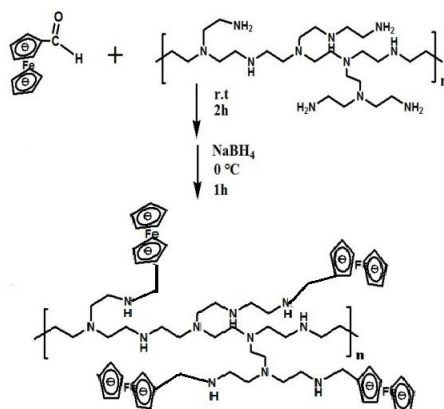


Figure S2. ^1H NMR spectra (600 MHz) of EMPLI1016 (A), 6-amino- β CD (B) and Em- β CD (C).

Figure S2 showed the ^1H NMR spectra of EMPLI1016, 6-amino- βCD and Em- βCD .

In the ^1H NMR spectrum of Em- βCD , it can be seen signals of both EMPLI1016 and 6-amino- βCD .

The synthetic procedure of the PEI-Fc was shown in Scheme S1.



Scheme S1. Synthetic route of the PEI-Fc.

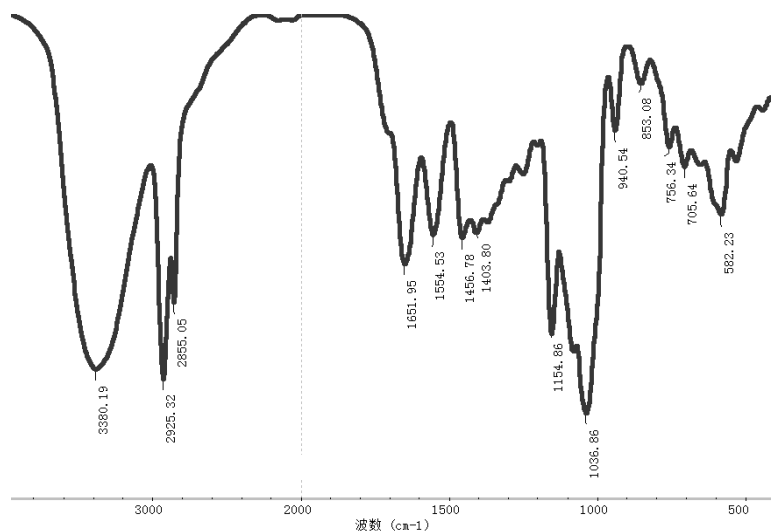


Figure S3. IR spectrum of PEI-Fc.

Figure S3 showed the IR spectrum of PEI-Fc. The features at 1641 and 1573 cm^{-1} were $\nu_{\text{C=O}}$ and $\delta_{\text{N-H}}$ respectively, confirming the formation of PEI-Fc.

^1H NMR was performed to investigate the composition of PEI-Fc (Figure S4).

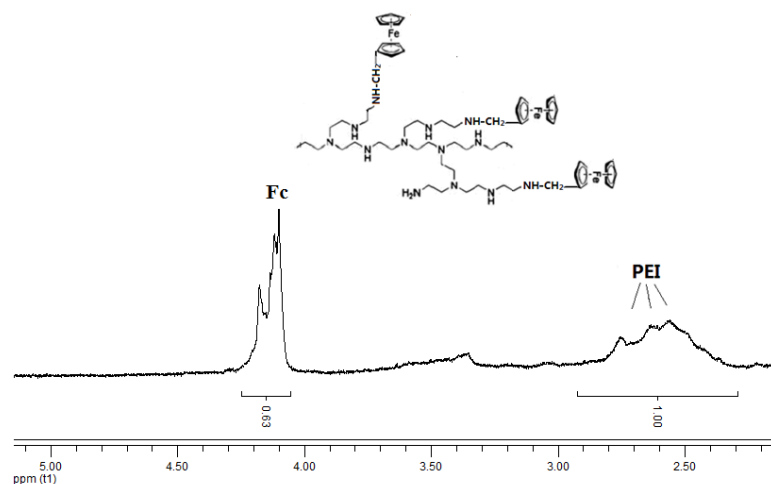


Figure S4. ¹H NMR spectrum (600 MHz) of PEI-Fc in CDCl₃.

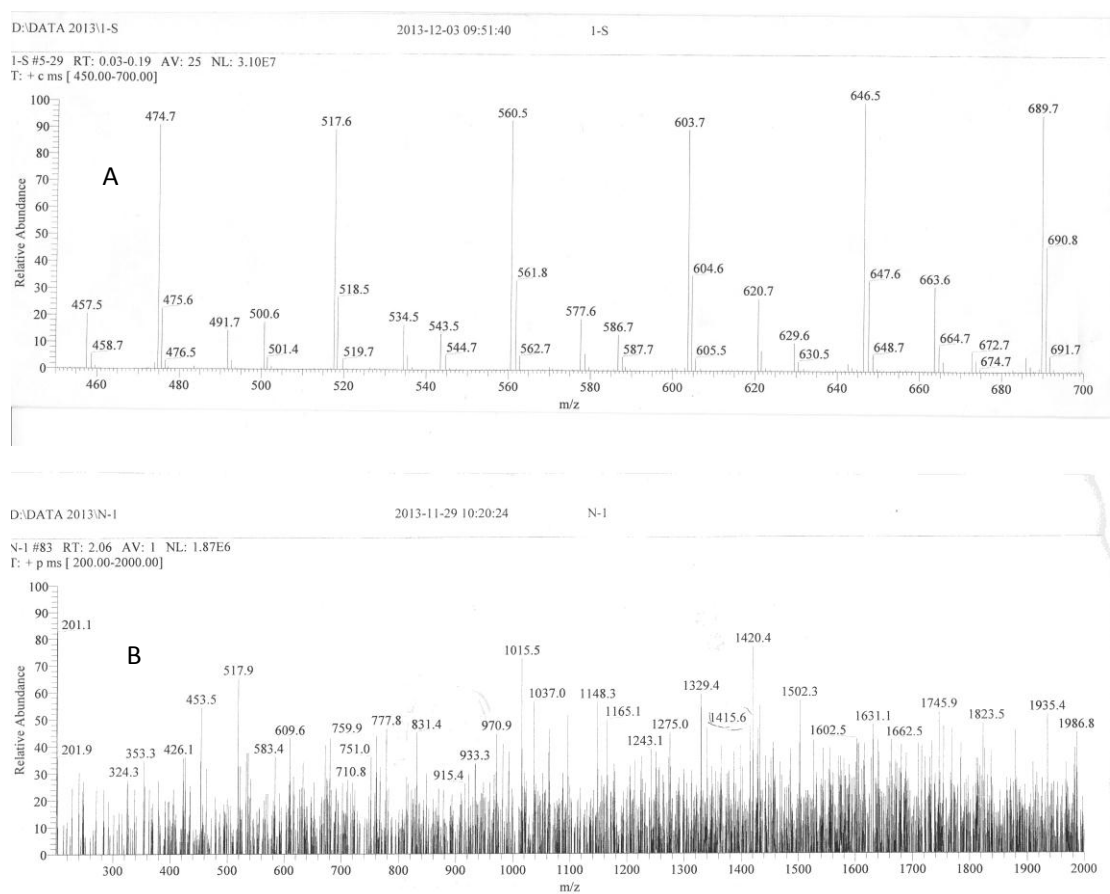


Figure S5. MS spectra of PEI (A) and PEI-Fc (B).

Figure S5 were MS spectra of PEI and PEI-Fc. It can be seen that PEI were composed of homologous series. The average molecular weight of PEI was 604. In the spectrum of PEI-Fc, a peak at $m/z = 1420$ (PEI + 4*Fc + Na) was observed,

indicating that each PEI-Fc chain contained 4 Fc groups. This result was quite consistent with the result of ^1H NMR.

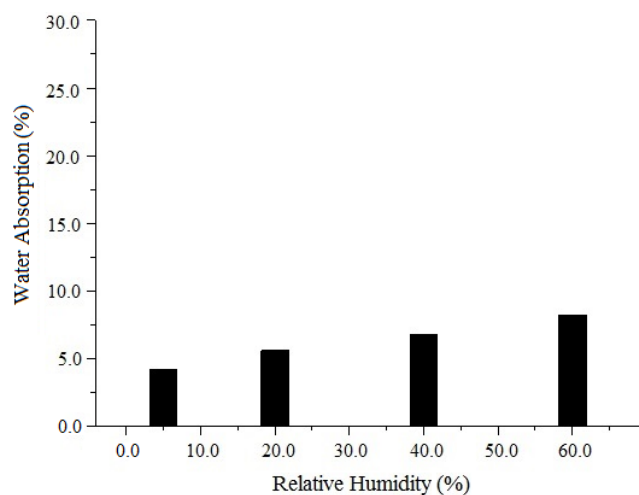


Figure S6. Water absorption of PEI-Fc/Em- β CD complex at different relative humidity.

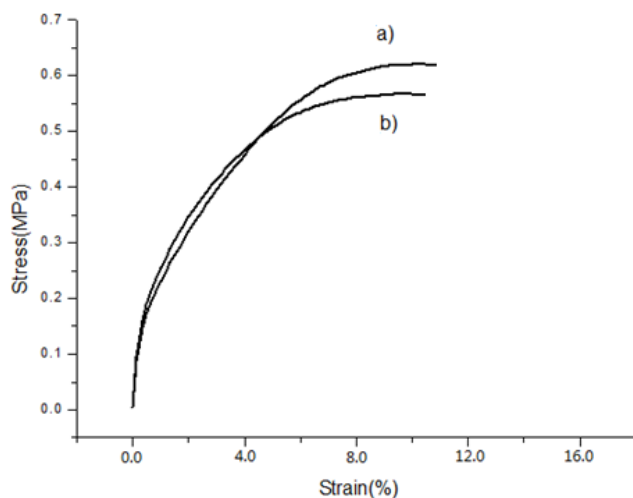


Figure S7. Tensile Stress-Strain Curves. a) PEI-Fc/Em- β CD complex; b) The re-formed PEI-Fc/Em- β CD complex.

Dynamic Compression Test. In dynamic compression tests, three different materials (PS foam, polyethylene (PE) bubble film and PEI-Fc/Em- β CD complex) were used. The thick of PS foam and PEI-Fc/Em- β CD complex was 0.5 cm). The water contents of PEI-Fc/Em- β CD complex were about 7-9%. After placing a pieces of glass sample

($1.0 \times 2.0 \times 0.3$ cm length \times width \times thick) between the test samples, a drop of 1 kg weight was fall from 60 cm height to impact the test samples. It was found that the glass sample protected by PS foam or polyethylene (PE) bubble film was crashed, however, PEI-Fc/Em- β CD complex protected the glass sample successfully (Supplementary movie 1).[实验视频.AVI](#)

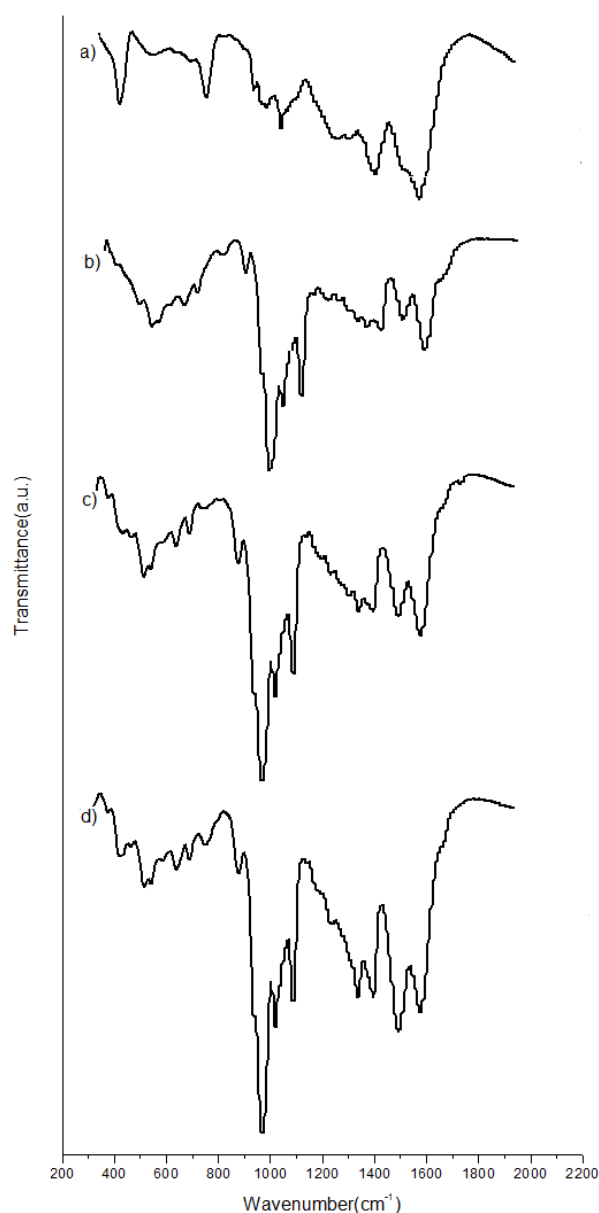


Fig. S8 1D-FTIR spectra of a) PEI-Fc; b) Em- β CD; c) PEI-Fc/Em- β CD complex; d) Physical mixtures of PEI-Fc and Em- β CD.

