

# **Supporting information**

## **The Motility of $\beta$ -Cyclodextrins Threaded on the Polyrotaxane Based Triblock Polymer and Its Influences on Mechanical Properties**

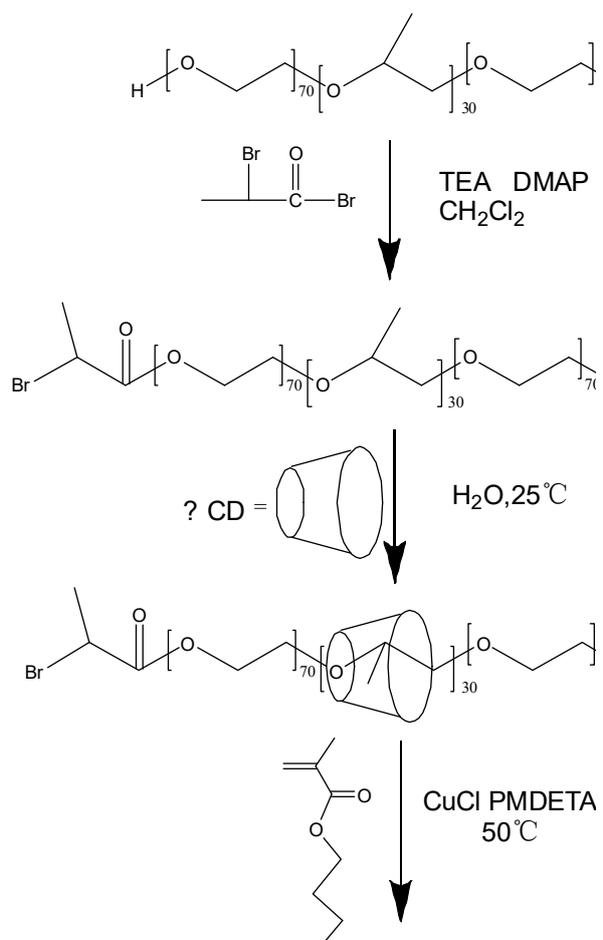
**Yufei Wang<sup>1,2,†</sup>, Yafang Niu<sup>1,2,†</sup>, Xue Geng<sup>2</sup>, Zengguo Feng<sup>2</sup>, Lin Ye<sup>1,2,\*</sup>**

**1. Tangshan Research Institute, Beijing Institute of Technology,  
Tangshan 063000, China**

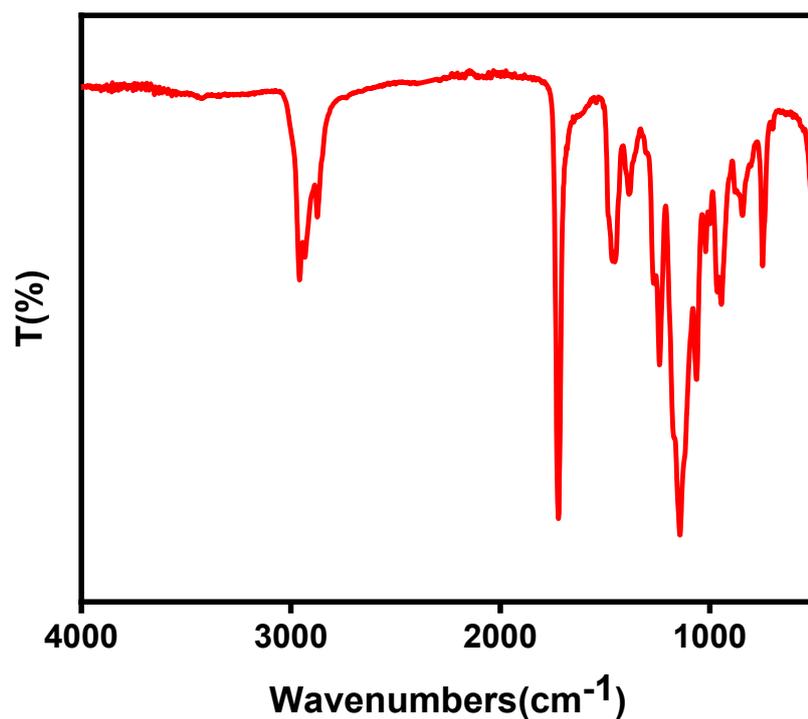
**2. School of Materials Science and Engineering, Beijing Institute of  
Technology, Beijing 100081, China**

\*Correspondence: [yelin@bit.edu.cn](mailto:yelin@bit.edu.cn)

† These authors contributed equally to this work.

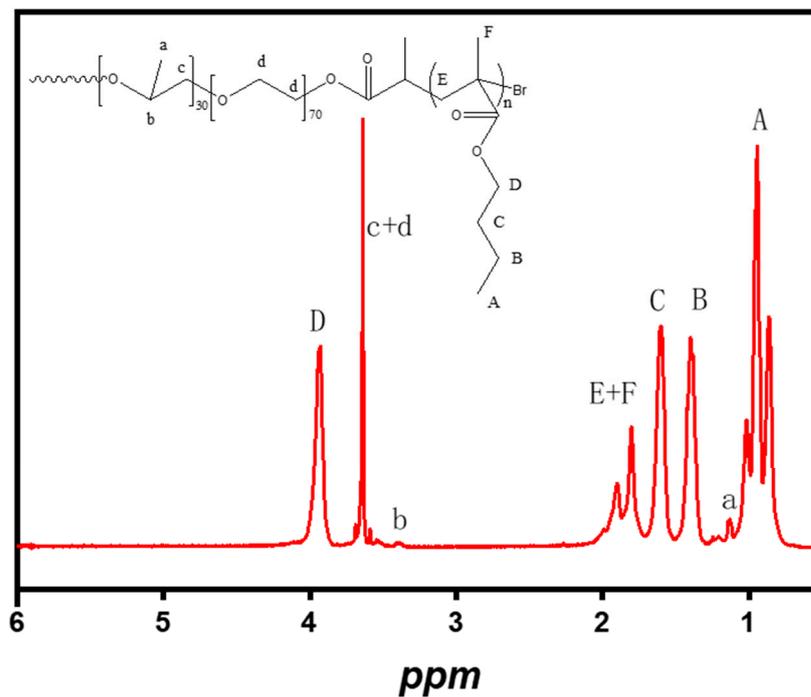


**Figure S1. Synthesis route of PR copolymer**



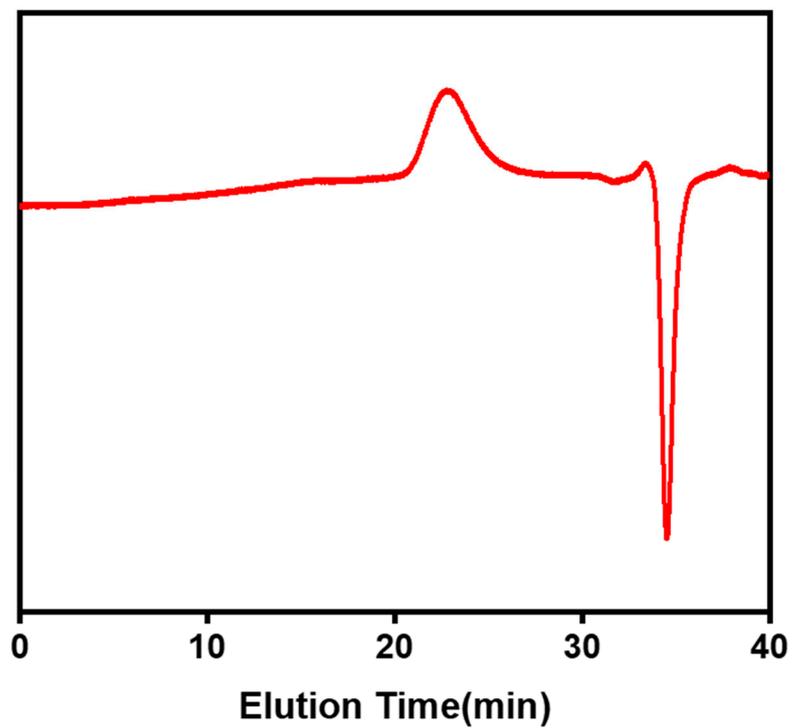
**Figure S2. FT-IR spectra of F68 copolymers**

The IR spectra are presented in Figure S2. The carboxyl absorption peak at 1748  $\text{cm}^{-1}$  of the F68 copolymer provides evidence that the F68 copolymer was successfully prepared by ATRP of BMA. Furthermore, no hydroxyl absorption peak at 3354  $\text{cm}^{-1}$  in the IR spectrum of the F68 copolymer was observed in comparison to the PR copolymer.



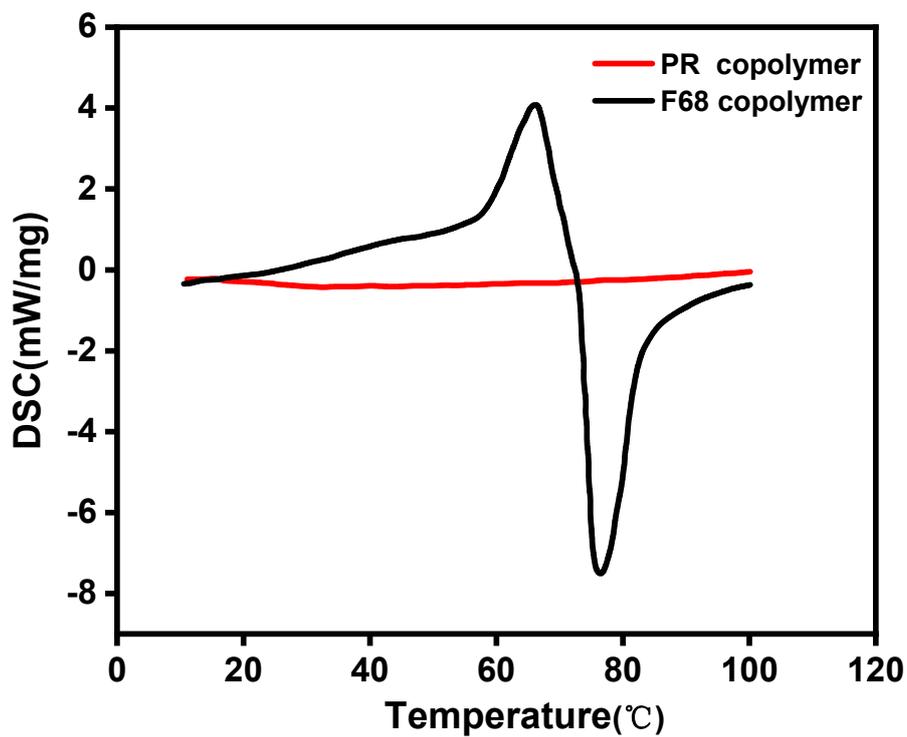
**Figure S3. <sup>1</sup>H-NMR spectrum of F68 copolymer after capping**

Figure S3 showed the characteristic peaks of methyl (peak a) and methylene (peak b) in the PPO moiety were at 1.0 ppm and 3.3 ppm, while the characteristic peaks (A~F) of PBMA occurred in the spectrum. Thus, the successful preparation of F68 copolymer was demonstrated.



**Figure S4. The GPC traces of F68 copolymer**

Figure S4 showed the GPC traces of F68 copolymer. There is a single and symmetrical peak. This also implied the successful end-capping reaction via bulk ATRP of BMA.



**Figure S5. The DSC curves of PR and F68 copolymers**

The F68 copolymer showed a clear melting peak of F68 crystallization around 76°C, but the PR copolymer sample did not show a clear melting peak of crystallization in the tested temperature range. It can be assumed that the addition of  $\beta$ -CD suppresses the crystallization of F68 in the original structure.