Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supplementary Information

Cationic micelles as nanocarriers for enhancing intra-cartilage drug penetration and retention

Chenxian Zhu,[a] Zhongxing Zhang,*[a] Yuting Wen,[a,b] Xia Song,[a] Jingling Zhu,[a,c] Yifei Yao,*[d] and Jun Li*[a,b,c]

[a] Department of Biomedical Engineering, National University of Singapore, 15 Kent Ridge Crescent, Singapore 119276, Singapore

[b] National University of Singapore (Chongqing) Research Institute, 2 Huizhu Road, Yubei District, Chongqing 401120, China

[c] NUS Environmental Research Institute (NERI), National University of Singapore, 5A Engineering Drive 1, Singapore 117411, Singapore

[d] School of Biomedical Engineering, Shanghai Jiao Tong University, Shanghai 200030, China

***Corresponding authors**

Emails: biezhozh@nus.edu.sg (ZZ), yifeiyao@sjtu.edu.cn (YY), jun-li@nus.edu.sg (JL).

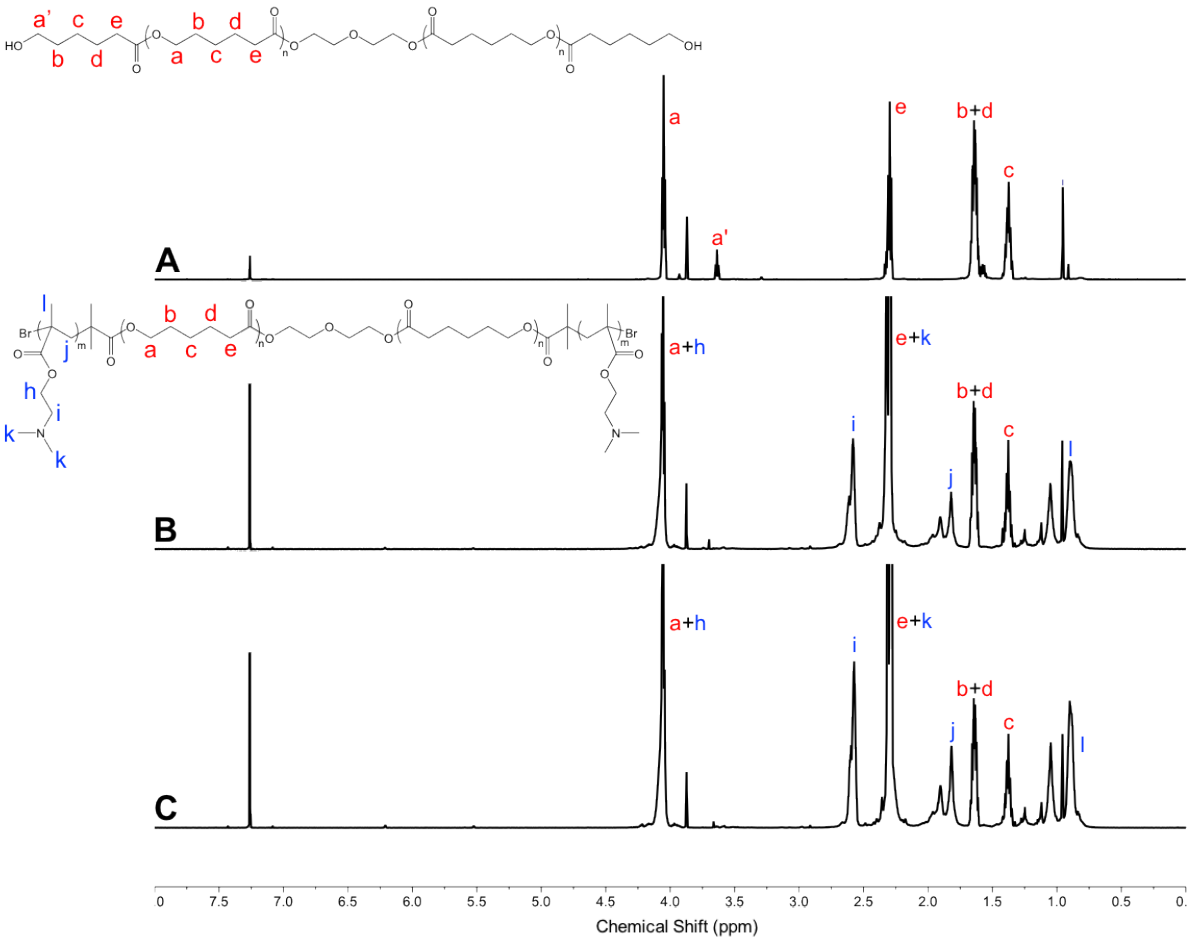

Figure S1. ^{1}H NMR spectra of polymers in $CDCl_3$. (A) PCL-diol; (B) $D_{16}CL_{17}D_{16}$; (C) $D_{24}CL_{17}D_{24}$.

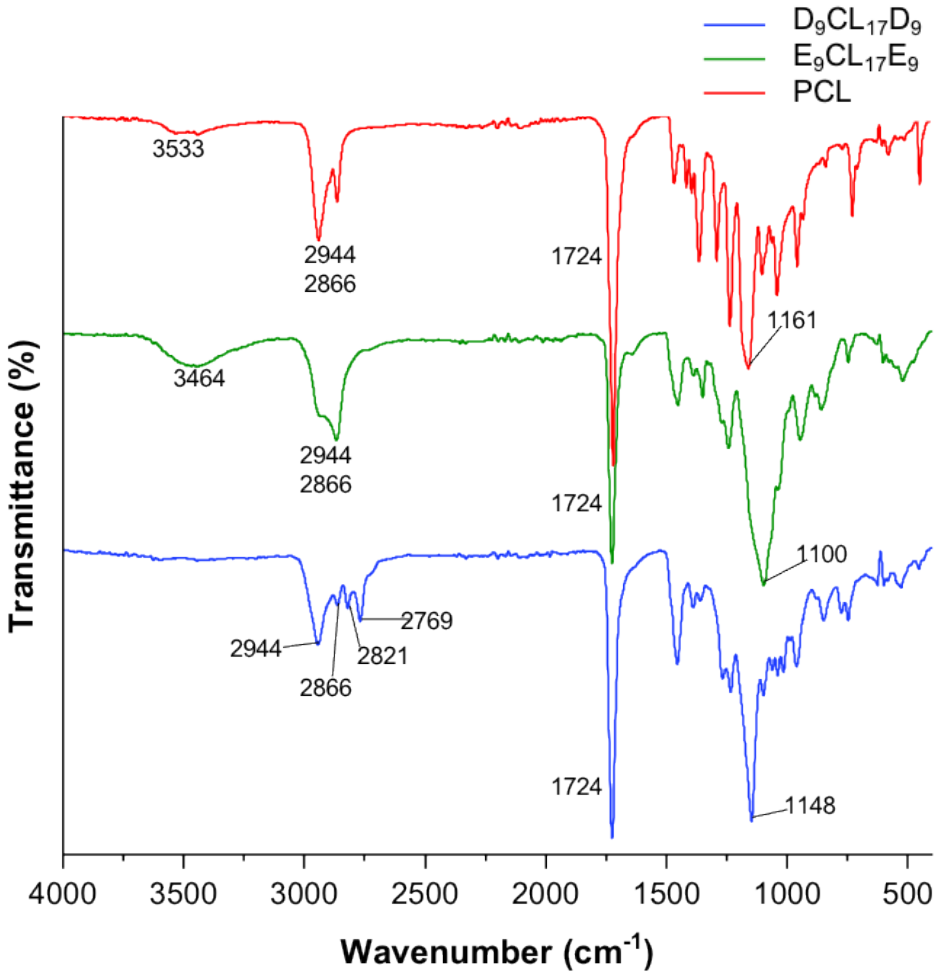

Figure S2. FTIR spectra of PCL-diol, $E_9CL_{17}E_9$, and $D_9CL_{17}D_9$.

Table S1. Zeta potential of $D_9CL_{17}D_9$ and $E_9CL_{17}E_9$ micelles at different pH values. Micelles were prepared by the nanoprecipitation method in 0.1 × PBS at a concentration of 1 mg/mL.

Copolymer	Zeta potential (mV)		
	pH = 5	pH = 7	pH = 9
$D_9CL_{17}D_9$	20.3	17.6	14.1
$E_9CL_{17}E_9$	-0.4	-0.6	-1.4

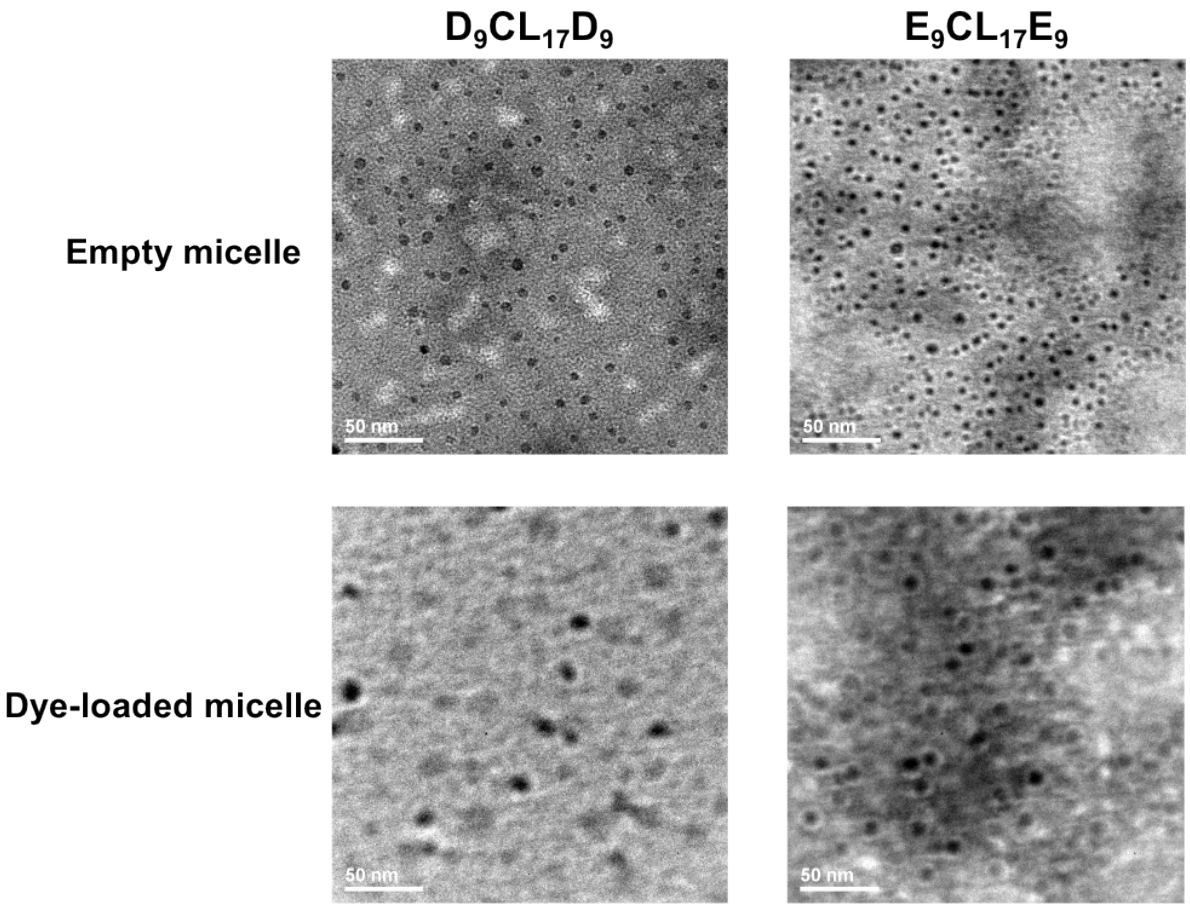

Figure S3. TEM images of empty and dye-loaded $D_9CL_{17}D_9$ and $E_9CL_{17}E_9$ micelles. Scale bar = 50 nm.

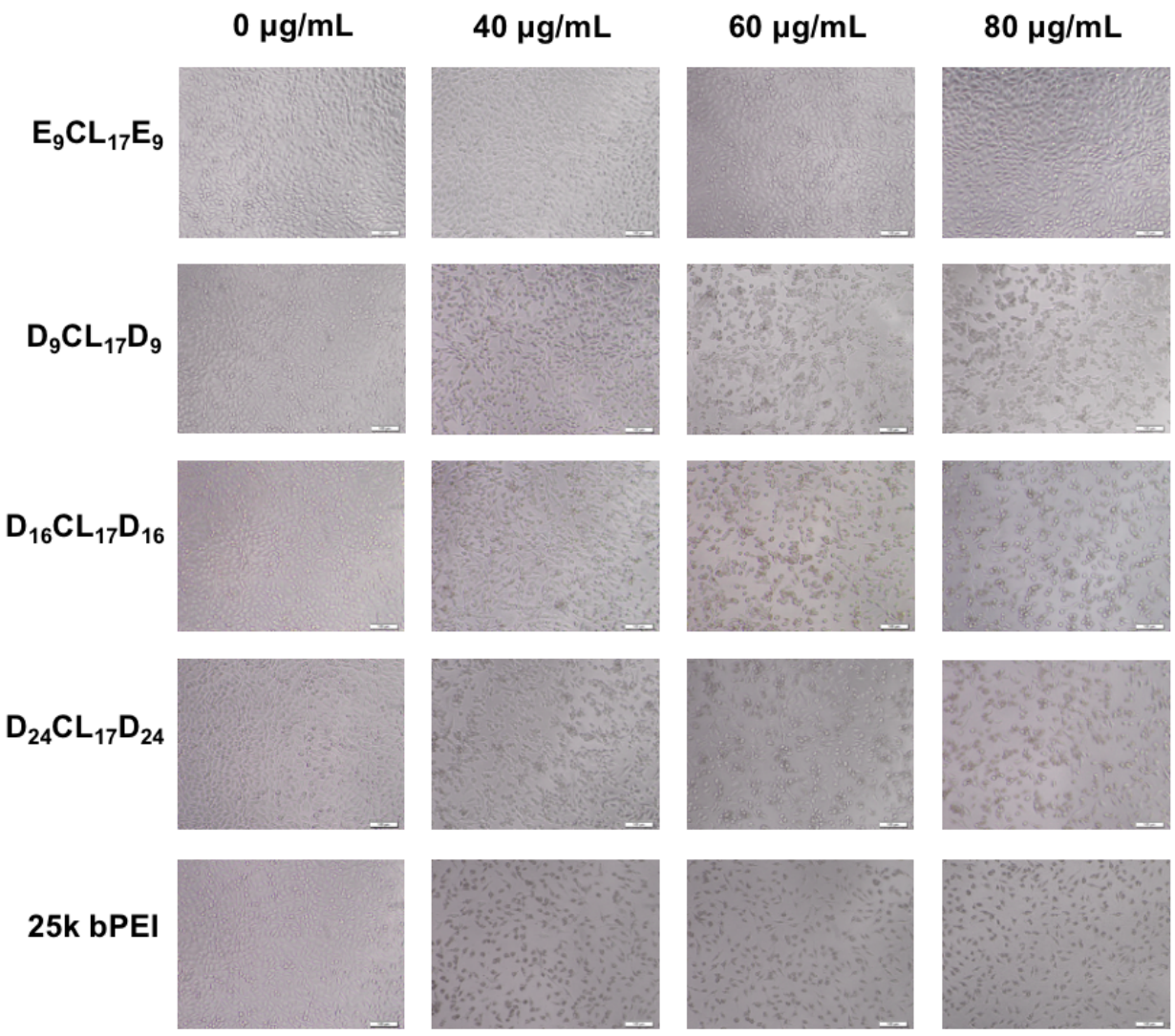

Figure S4. Cell morphology after treated with different micelles and bPEI was observed by microscopy at bright field at 10 × magnification. Scale bar = 100 μm.

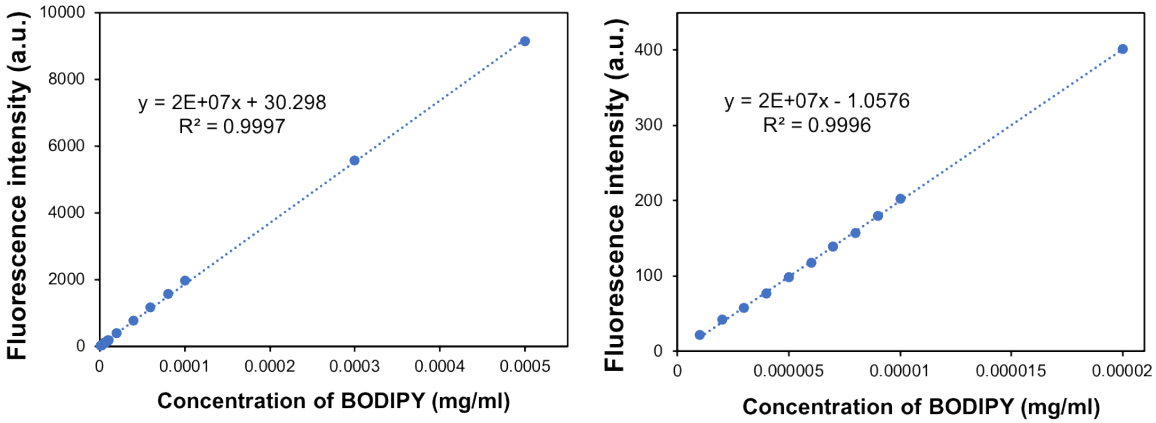

Figure S5. The standard curve of BODIPY with two concentration ranges in a mixture of 20% v/v DI water and 80% v/v acetone.

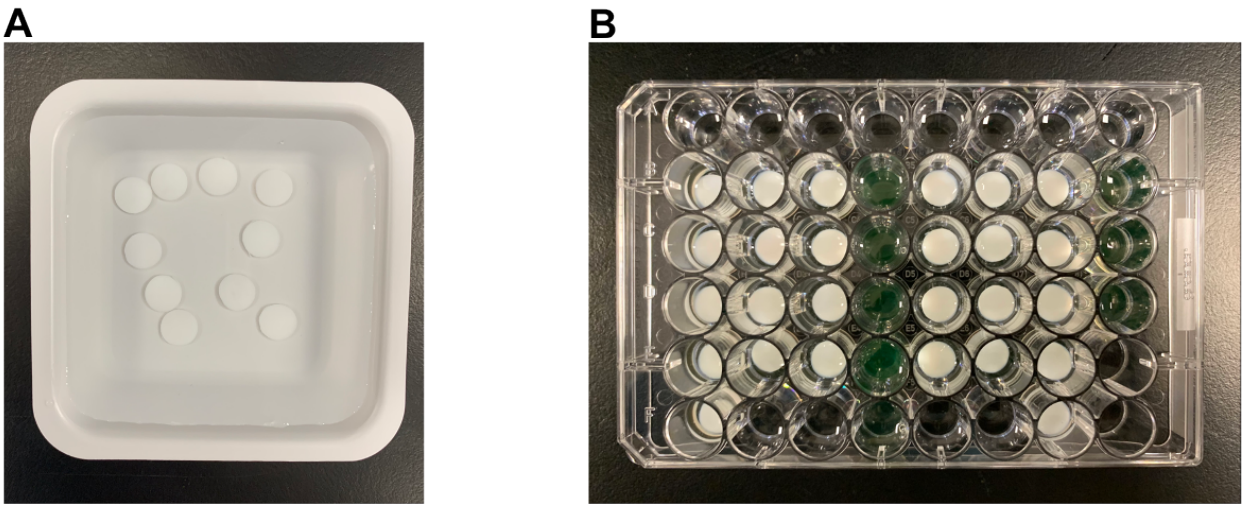

Figure S6. Photos of excised porcine cartilage disks. (A) After harvesting, the disks (∅ 9 × 1.5 mm) were washed and equilibrated with a sterile PBS solution. (B) For the absorption or desorption experiments, cartilage disks were equilibrated in 300 µL of absorption or desorption baths in the 48-well plate.