Supporting Information

Topology-Assisted, Photo-Strengthened DNA/siRNA Delivery Mediated by Branched Poly(β-Amino Ester)s via Synchronized Intracellular Kinetics

Shanzhou Duan,[a,‡] Desheng Cao,[b,‡] Xudong Li,[b] Huifang Zhu,[c,*] Zhengzhong Tan,[d] Ziyuan Song,[d] Rongying Zhu,[a] Lichen Yin, [b,*] Yongbing Chen[a,*]

[a] Department of Thoracic Surgery, the Second Affiliated Hospital of Soochow University, Suzhou 215004, P.R. China.

[b] Jiangsu Key Laboratory for Carbon-Based Functional Materials and Devices, Institute of Functional Nano and Soft Materials (FUNSOM), Collaborative Innovation Center of Suzhou Nano Science and Technology, Soochow University, Suzhou 215123, P.R. China.

[c] Analysis and Testing Center, Soochow University, Suzhou, 215123, P.R. China.

[d] Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, 1304 W Green St, Urbana 61801, IL, USA

Address correspondence to chentongt@sina.com (Y. Chen), lcyin@suda.edu.cn (L. Yin), or hfzhu@suda.edu.cn (H. Zhu).

‡ These authors contributed equally.

Table S1. Sequences of siRNA.

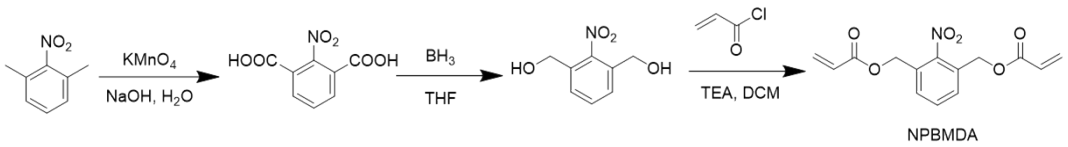
siRNA	Sequence (5′-3′)
siSur sense	ACCGCAUCUCUACAUUCAA dTdT
siSur antisense	UUGAAUGUAGAGAUGCGGU dTdT
siNC sense	UUCUUCGAACGUGUCACGUTT
siNC antisense	ACGUGACACUUCGGAGAATT

Table S2. Forward (F) and Reverse (R) primer sequences.

Primer	Sequence (5′-3′)
Survivin F	AAACCAGACCCTCATGGCTAC
Survivin R	TCCCAGACTCCACTCCAACTT
GAPDH F	CATGCCGCCTGGAAACCTGCCA
GAPDH R	TGGGCTGGGTGGTCCAGGGGTTTC

Table S3. GPC results of polymers.

Polymer	M_n (Da)	M_w (Da)	PDI
LPAE	16800	22700	1.35
BPAE-NB	18100	33100	1.83
BPAE-CC	15400	26400	1.71



Scheme 1. Synthetic route of NPBMDA.

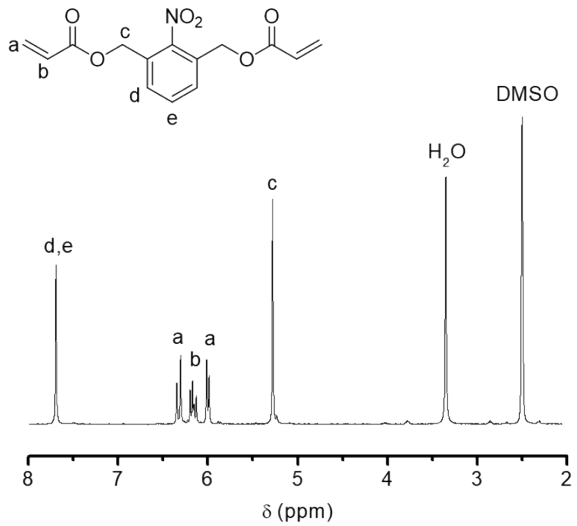


Fig. S1. ^{1}H NMR spectrum of (2-nitro-1,3-phenylene)bis(methylene) diacrylate (NPBMDA) (DMSO-d_6, 400 MHz).

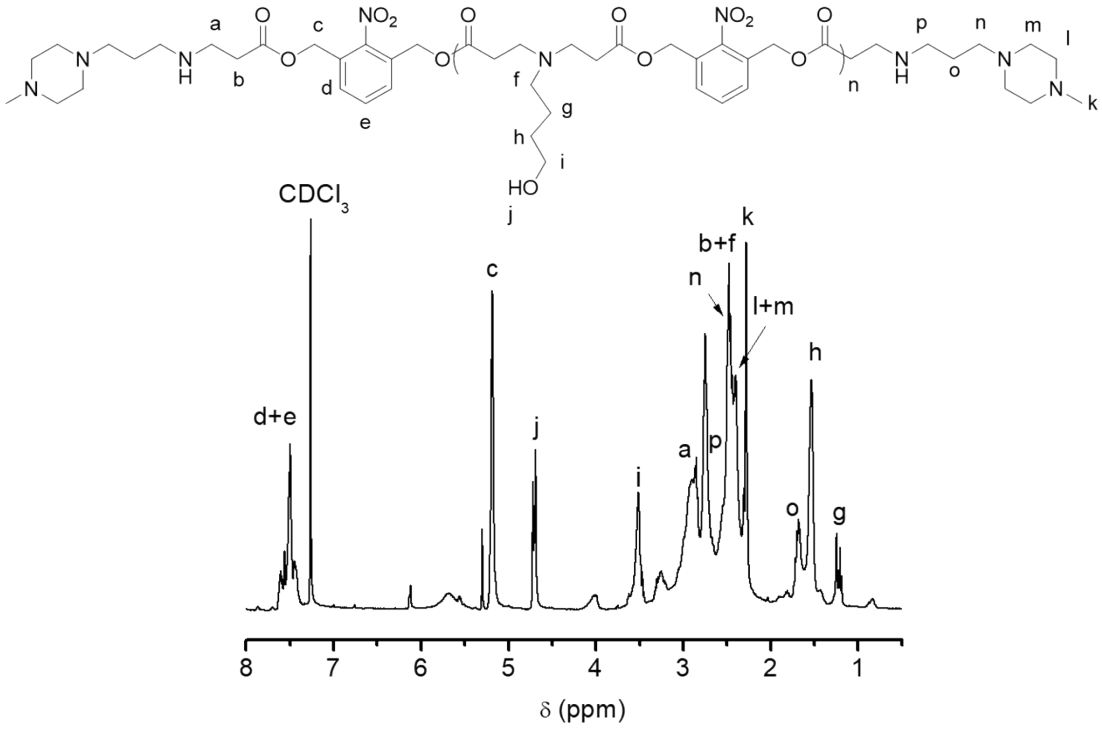


Fig. S2. ^{1}H NMR spectrum of LPAE-NB ($CDCl_3$, 400 MHz).

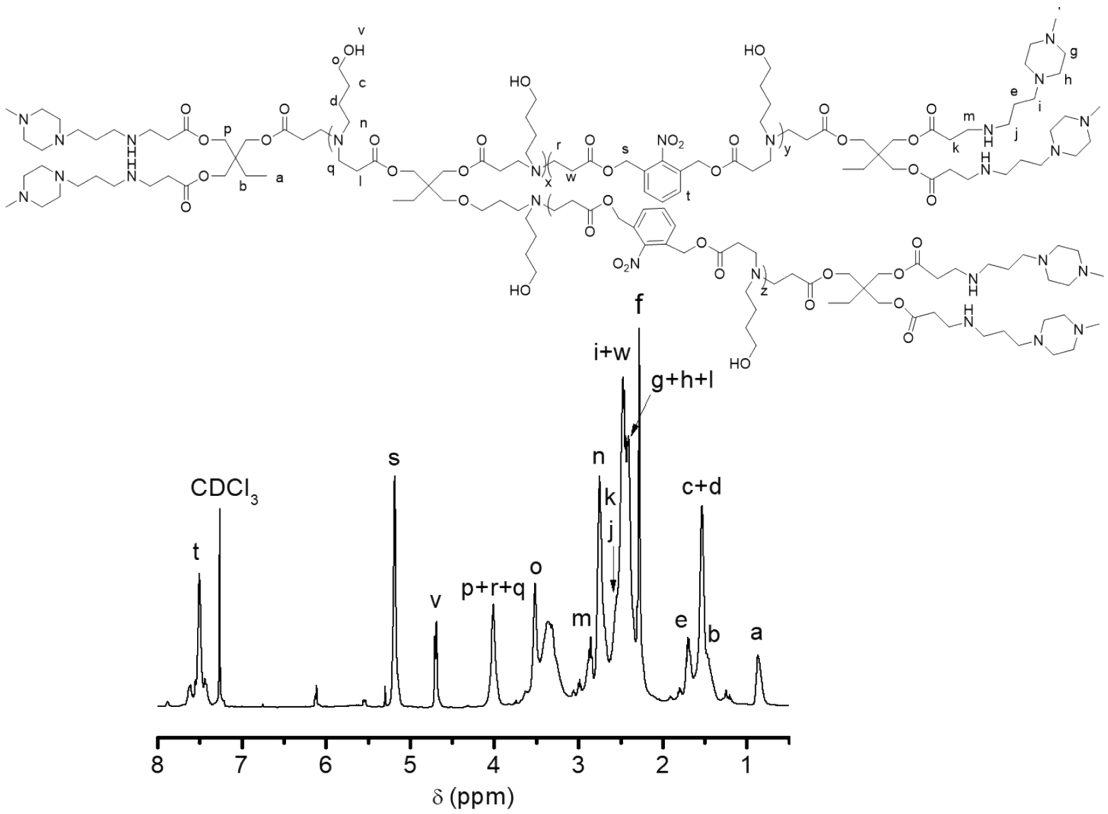


Fig. S3. ^{1}H NMR spectrum of BPAE-NB ($CDCl_3$, 400 MHz).

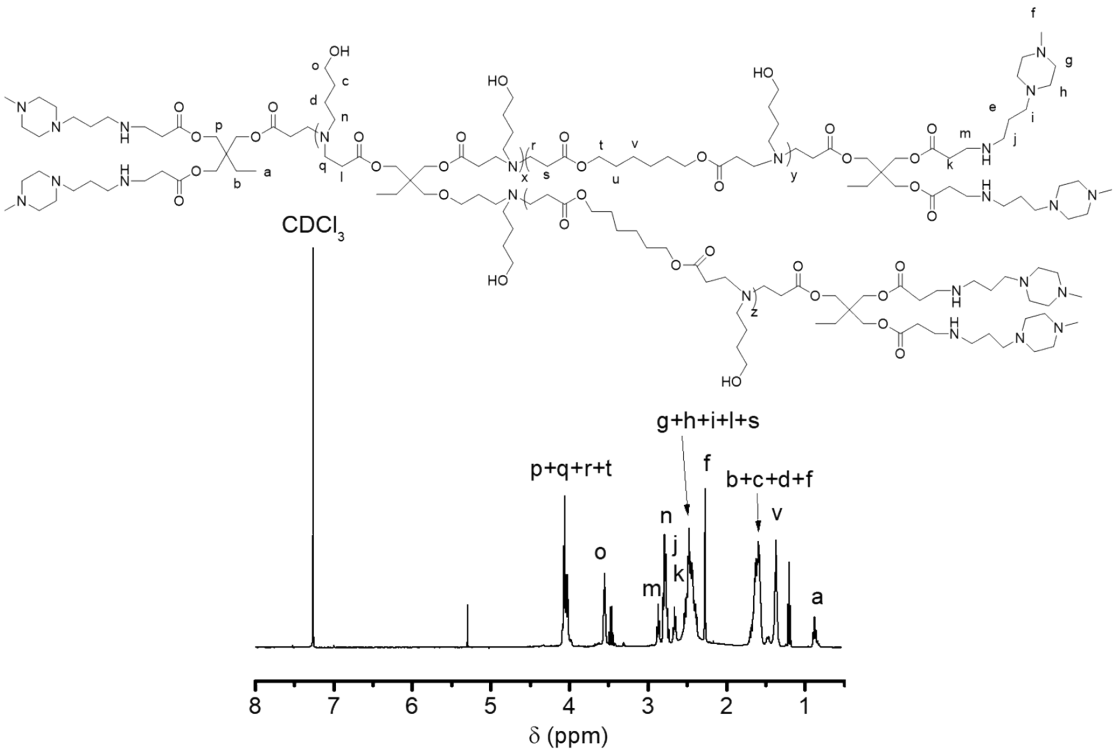
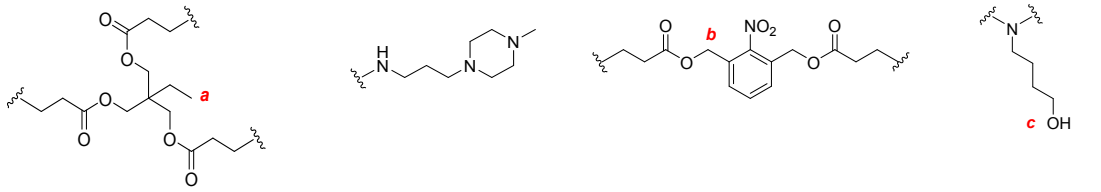


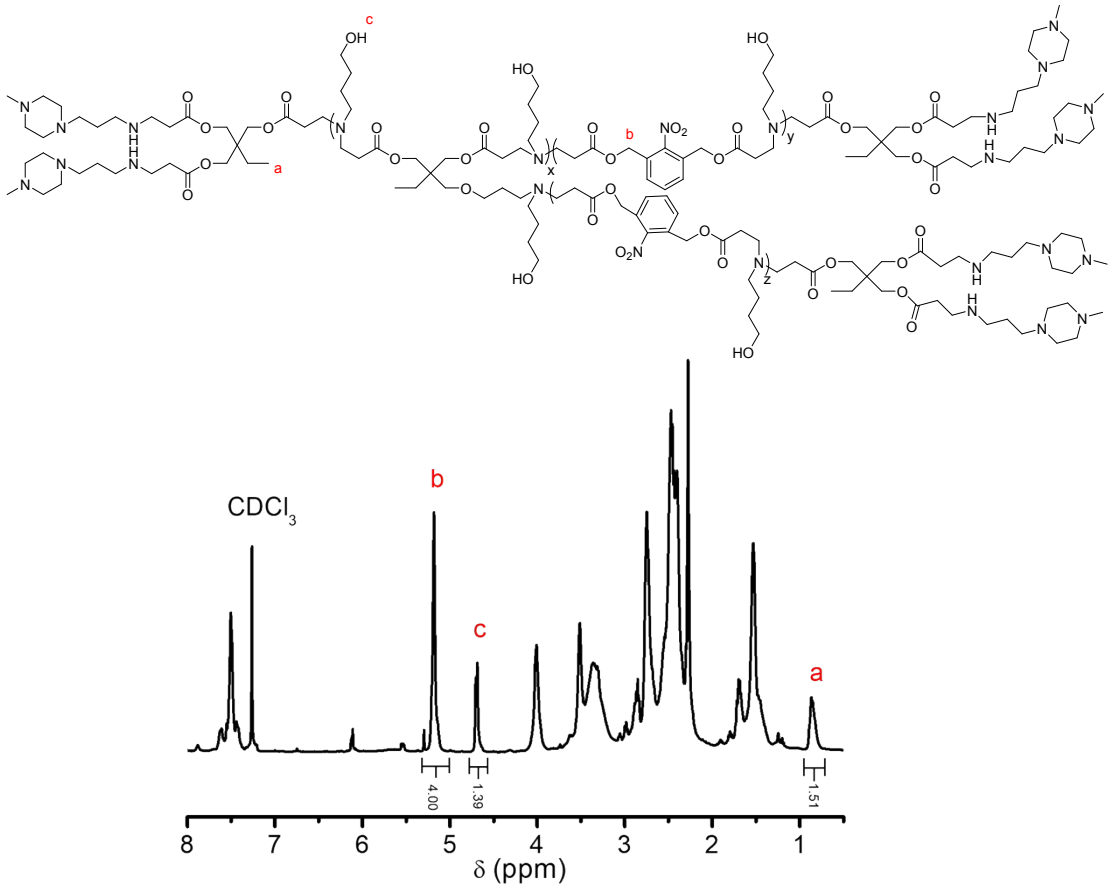
Fig. S4. ^{1}H NMR spectrum of BPAE-CC ($CDCl_3$, 400 MHz).

Degree of branching (DB) = (dendritic units + terminal units)/(dendritic units + terminal units + linear units) = (D + T)/(D + T + L)



Dendritic units (D) Terminal units (T) Linear units (L) Other units (O)

According to the synthesis, MPZ was added last, and the final NMR spectrum revealed no peaks for double bond. 3D + 2L = 2O + T



From the integrals on NMR spectrum, 4L = 4.00; 3D = 1.51; O = 1.39.
So L = 1.00, D = 0.50, O = 1.39;
As 2L + 3D = 2O + T, T = 0.73.
DB = (D + T)/(D + T + L) = 0.55.

Fig. S5. The process of calculating the DB of BPAE-NB.

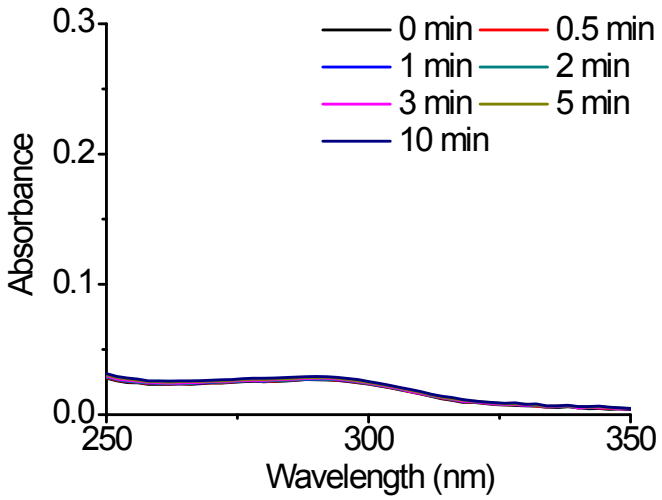


Fig. S6. UV-Vis spectra of BPAE-CC after UV irradiation (λ = 365 nm, 20 mW/cm^2) for different time.

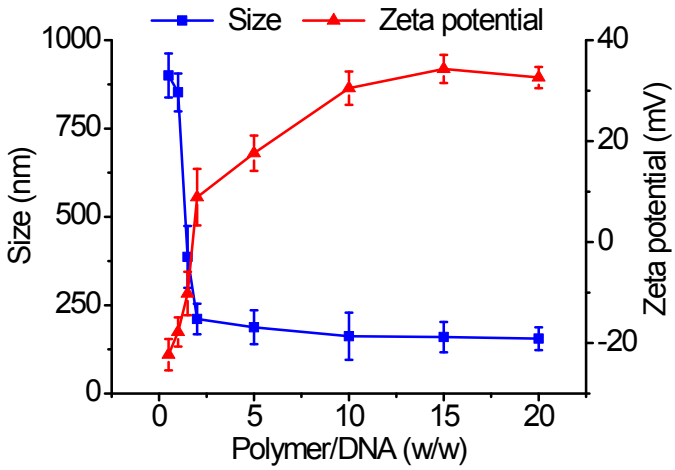


Fig. S7. Size and zeta potential of BPAE-CC/DNA polyplexes at various polymer/DNA weight ratios.

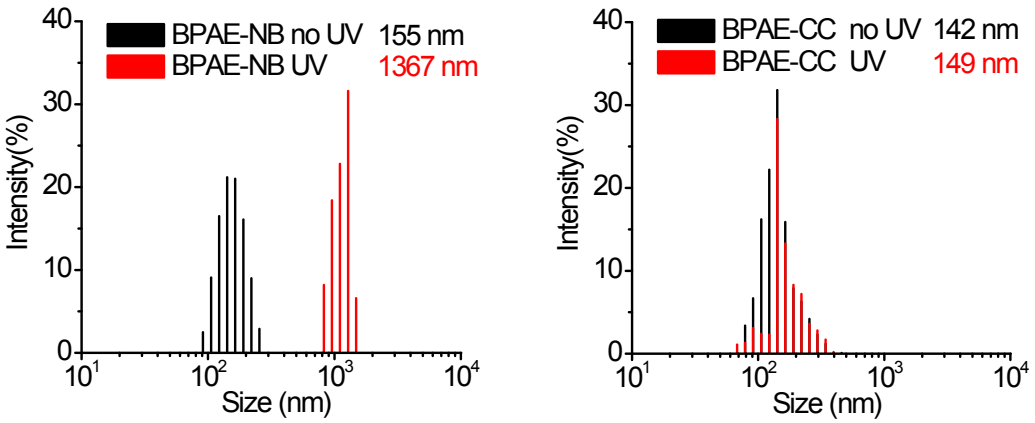


Fig. S8. UV-triggered size alteration of BPAE-NB/DNA and BPAE-CC/DNA polyplexes (w/w = 5) following UV light irradiation (λ = 365 nm, 20 mW/cm^2, 5 min).

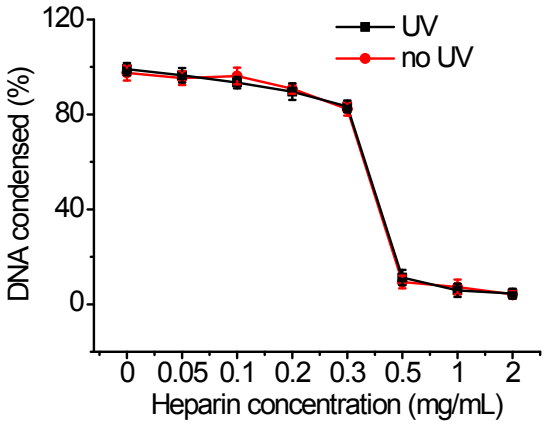


Fig. S9. DNA release from BPAE-CC/DNA polyplexes (w/w = 5) in the presence of heparin at various concentrations before and after UV light irradiation (λ = 365 nm, 20 mW/cm^2, 5 min) (n = 3).