Electronic Supplementary Material

Cationic copolymer and crowding agent have a cooperative effect on a Na^+-dependent DNAzyme

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Experimental Methods

Synthesis of cationic copolymers

The cationic copolymers poly($_L$-lysine)-*graft*-dextran (PLL-*g*-Dex) and poly($_L$-lysine)-*graft*-poly(ethylene glycol) (PLL-*g*-PEG) were prepared according to previously reported protocols.[1] Briefly, the reduced end of dextran or poly(ethylene glycol) was covalently conjugated to the amino group of poly($_L$-lysine) in the presence of sodium cyanoborohydride as a reducing agent in 0.1 M sodium borate buffer (pH 8.5). Unreacted dextran or poly(ethylene glycol) was removed by ion-exchange chromatography. The copolymers were purified by dialysis and then freeze-dried. The products were characterized by ^{1}H NMR (Bruker Avance 400) at 60 °C and by gel permeation chromatography (Jasco). The grafting degree of dextran was 90 wt% for PLL-*g*-Dex, and the grafting degree of poly(ethylene glycol) was 80 wt% for PLL-*g*-PEG.

Supporting Figures

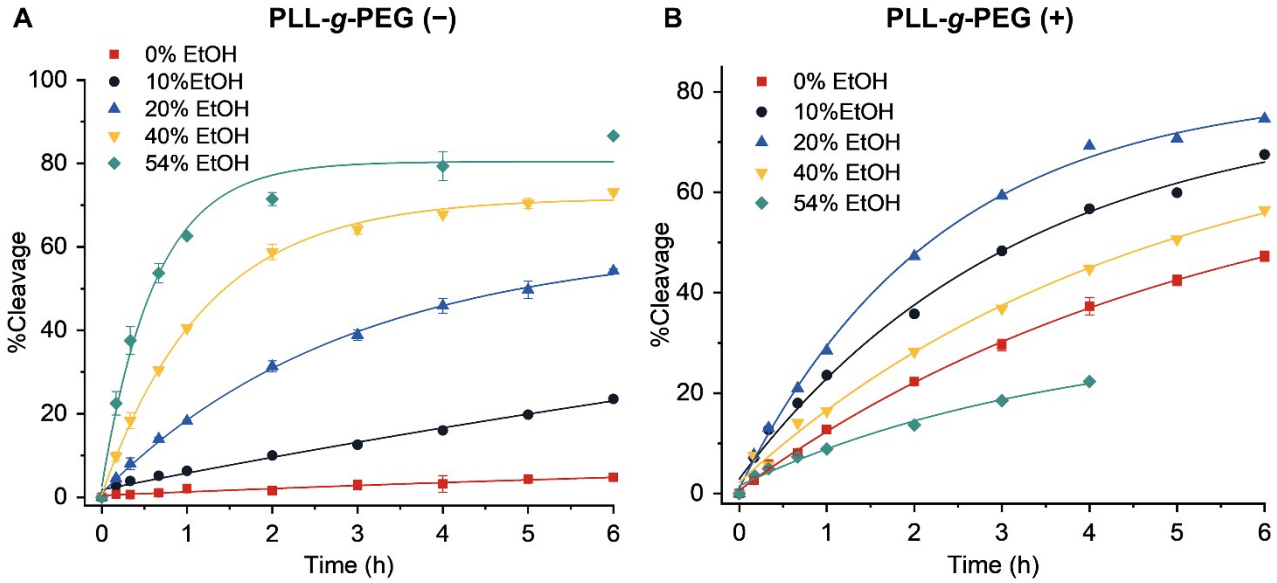

Fig. S1 Ethanol concentration dependence of DNAzyme activity in the (A) absence or (B) presence of PLL-*g*-PEG.

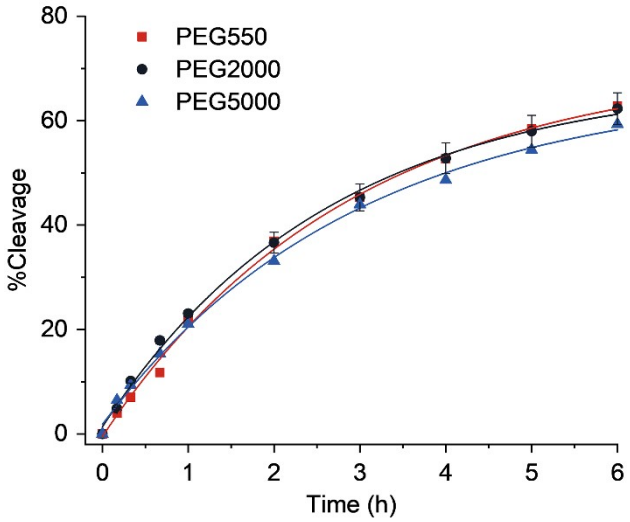

Fig. S2 Effect of molecular weight of PEG on the cleavage activity of DNAzyme.

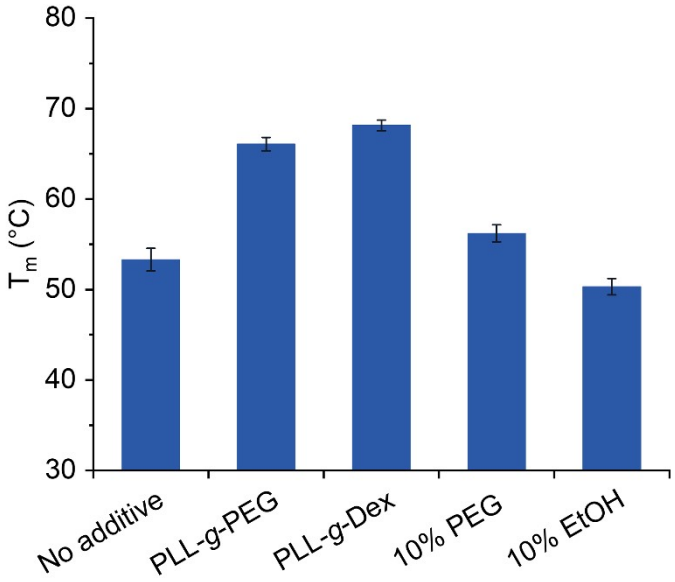

Fig. S3 The melting temperature (Tm) of the DNAzyme/substrate complex without any additives or with PLL-*g*-PEG, PLL-*g*-Dex, 10% PEG, 10% EtOH as additive, respectively. Samples contained 1 μM EtNa DNAzyme and 1 μM substrate in MES buffer (50 mM MES, 120 mM NaCl, pH6.0) and indicated additive.

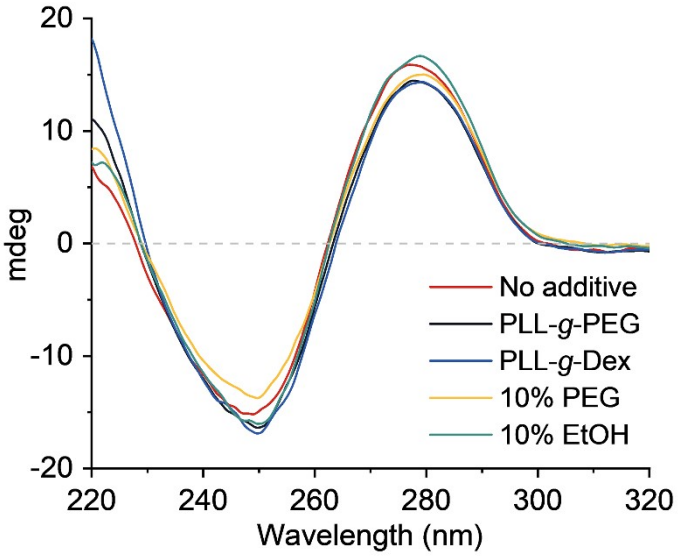

Fig. S4 The circular dichroism (CD) spectra of the DNAzyme/substrate complex without any additives or with PLL-*g*-PEG, PLL-*g*-Dex, 10% PEG, 10% EtOH as additive, respectively. Samples contained 2 μM EtNa DNAzyme and 2 μM substrate in MES buffer (50 mM MES, 120 mM NaCl, pH6.0) and indicated additive.

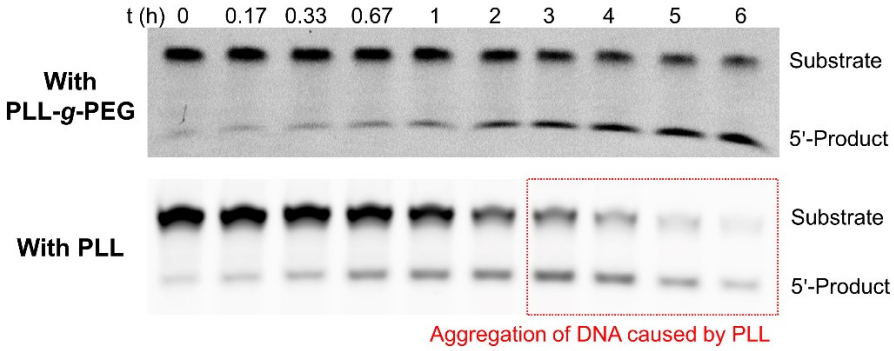

Fig. S5 Gel characterization of EtNa DNAzyme in the presence of PLL-g-PEG or PLL homopolymer. The PLL homopolymer results in the aggregation of DNA due to the formation of insoluble complex, thereby hindering the DNAzyme reaction.

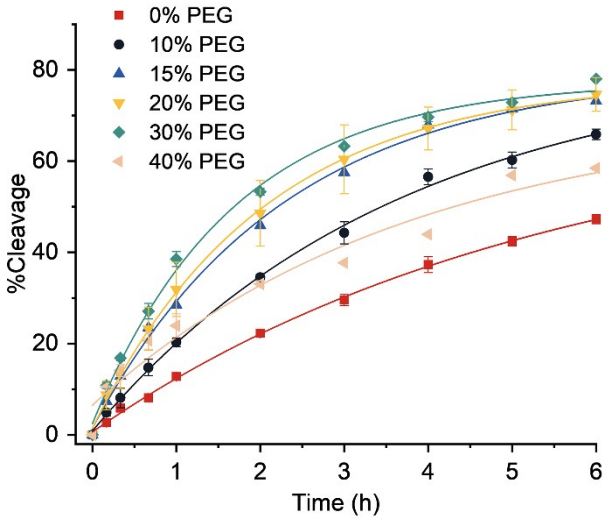

Fig. S6 PEG concentration dependence of DNAzyme activity in the presence of PLL-*g*-PEG.