Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Article

Supplementary Information: Reductant-dependent DNA-templated silver nanoparticle formation kinetics

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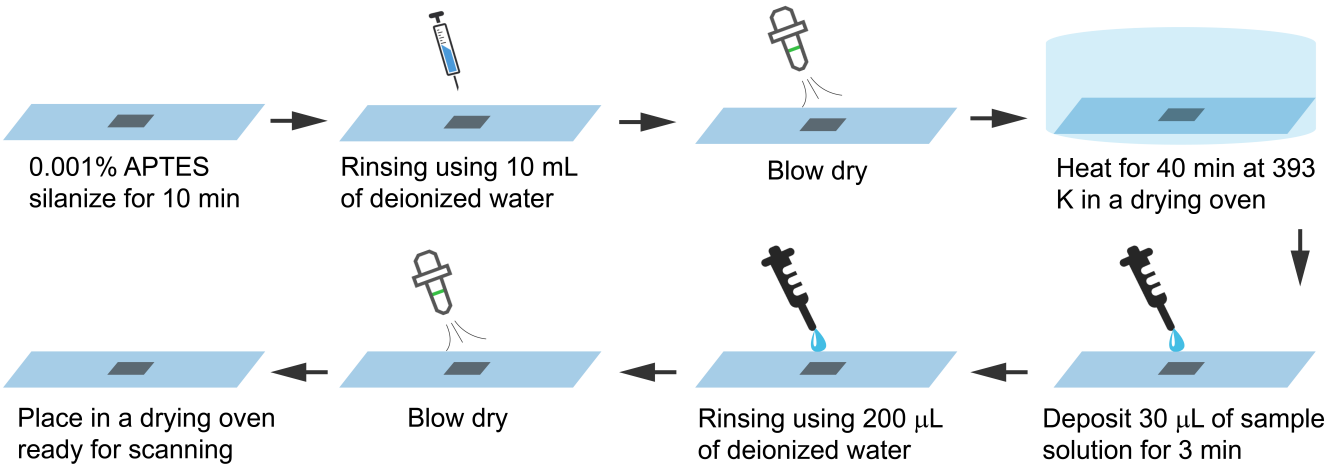

Figure S1 Procedures of the sample preparation for AFM characterization.

1 Force-dependent kinetics in the presence of different reductants

As shown in Fig.S6, in 0.01 mM $AgNO_3$ solution, exerting a force of 7.2 pN resulted in decrease–increase kinetics in the presence of 0.1 mM $NaBH_4$. In contrast, given the same conditions, forces larger than 11.5 pN could inhibit the decrease in kinetics and directly cause DNA restoration. With the [reductant]/[Ag^+] ratio fixed at 10, an increased Ag^+ concentration (1 mM) resulted in direct particle formation kinetics even at forces as high as 13.8 pN. This proved that $NaBH_4$ is very efficient in facilitating AgNP formation. In contrast to the strong effect of $NaBH_4$ in 1 mM $AgNO_3$ solution, in the presence of 10 mM L-ascorbic acid, the decrease kinetics exhibited at a force of 11.8 pN was inhibited by exerting a larger force of 14.2 pN, resulting in direct DNA recovery kinetics. Finally, a critical force value close to 2.9 pN was required to stop the nucleation dynamics in the presence of 10 mM sodium citrate and 1 mM Ag^+. The results were consistent with the statements and the model in the manuscript. Namely, external forces created an additional energy barrier for the nucleation; addition of different re-

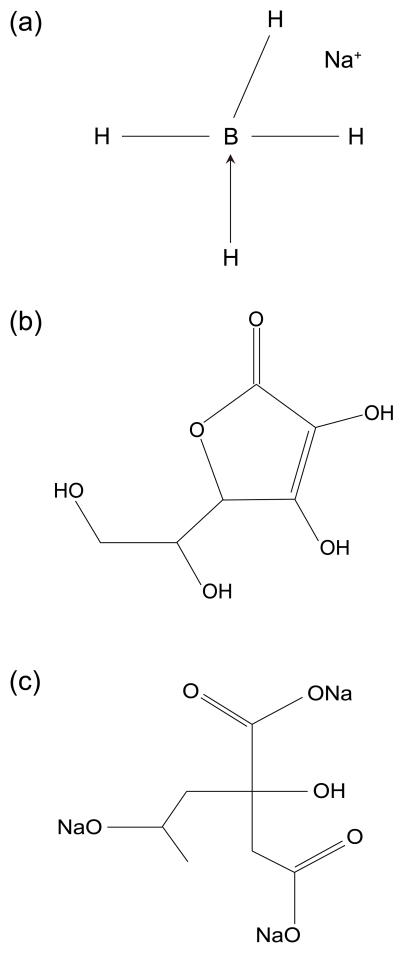

Figure S2 Chemical structures of $NaBH_4$, L-ascorbic acid, and sodium citrate.

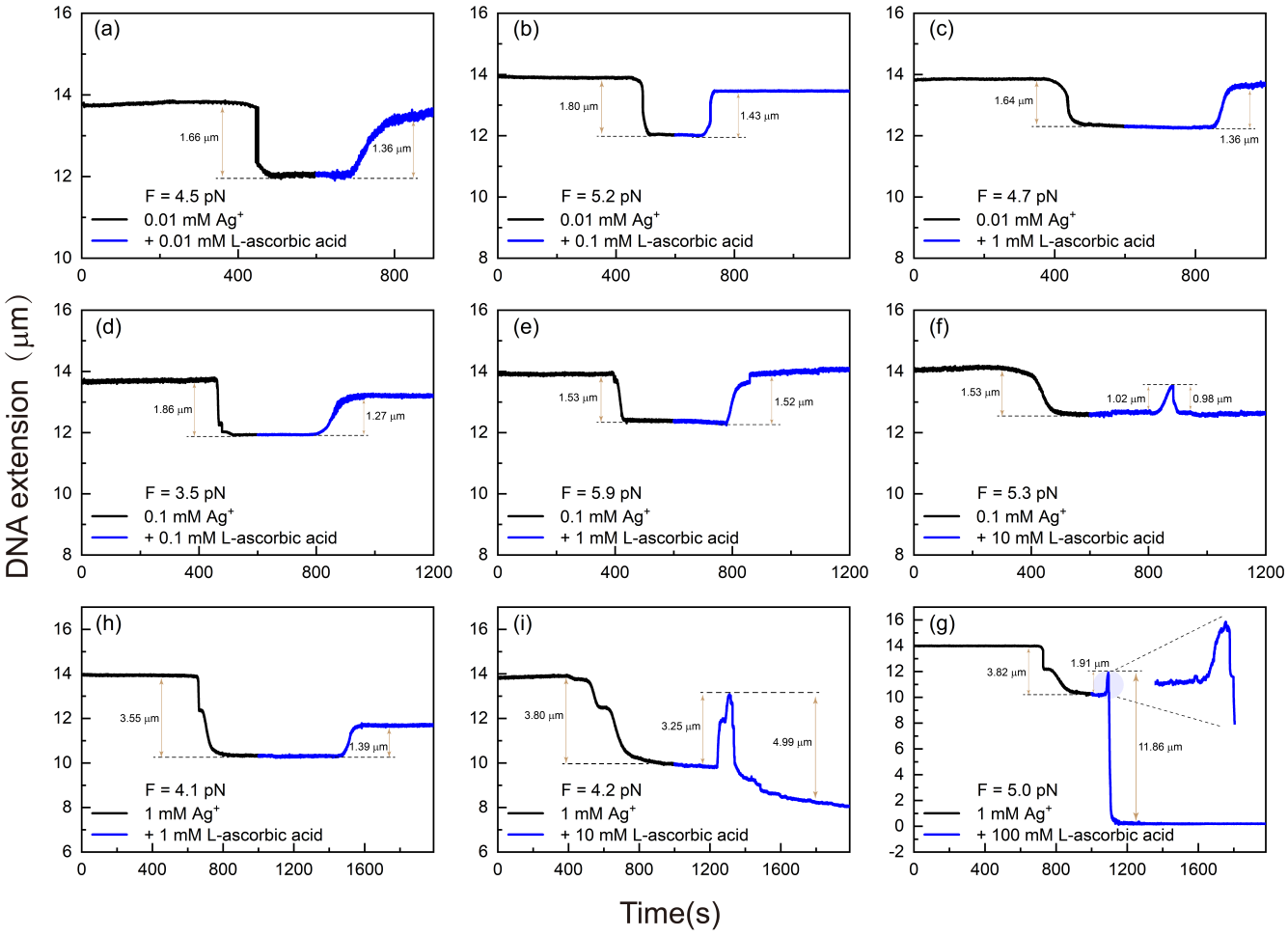

Figure S3 Extension–time curves of λ-DNA in the presence of L-ascorbic acid. From top to bottom, [Ag^+] = 0.01, 0.1 and 1 mM, respectively. From left to right, [L-ascorbic acid]/[Ag^+] = 1, 10, and 100, respectively.

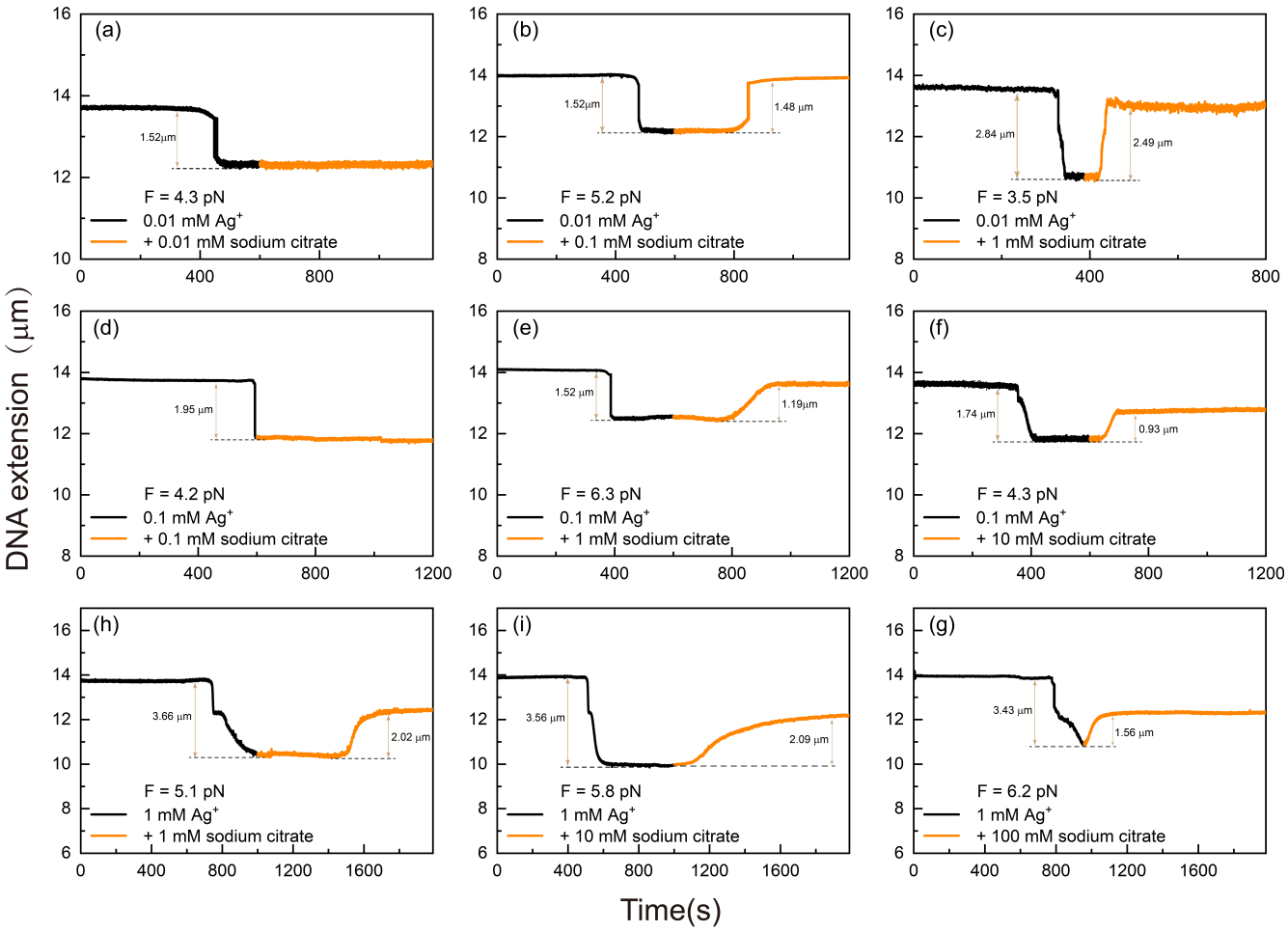

Figure S4 Extension–time curves of λ-DNA in the presence of sodium citrate. From top to bottom, $[Ag^+]$ = 0.01, 0.1 and 1 mM, respectively. From left to right, [sodium citrate]/$[Ag^+]$ = 1, 10, and 100, respectively.

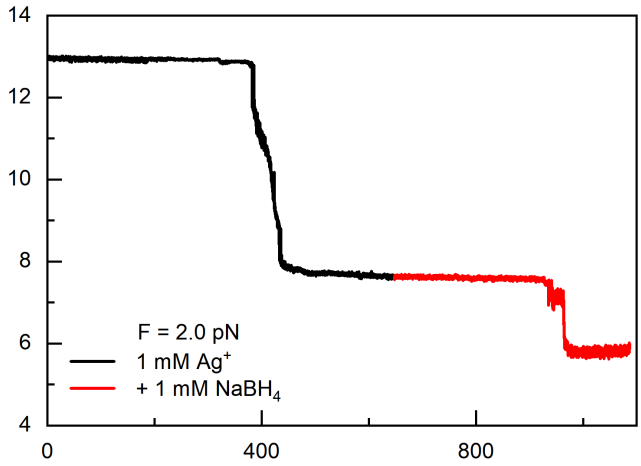

Figure S5 Extension–time curve of λ-DNA under small force (F = 2.0 pN). $[Ag^+]$ = 1 mM, $[NaBH_4]$ = 1 mM.

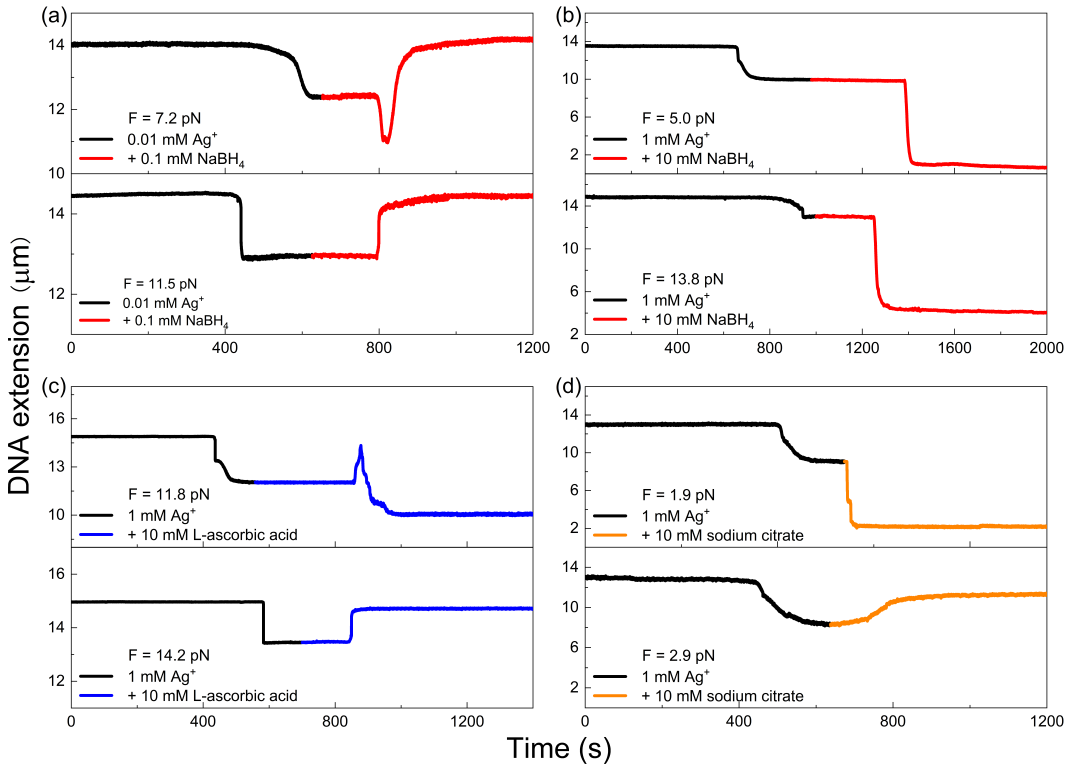

Figure S6 Extension–time curves of λ-DNA under different forces. (a) 0.01 mM Ag^+ + 0.1 mM $NaBH_4$; (b) 1 mM Ag^+ + 10 mM $NaBH_4$; (c) 1 mM Ag^+ + 10 mM L-ascorbic acid; (d) 1 mM Ag^+ + 10 mM sodium citrate.

ductants resulted in different degree of supersaturation, leading to different capabilities to induce nucleation kinetics.

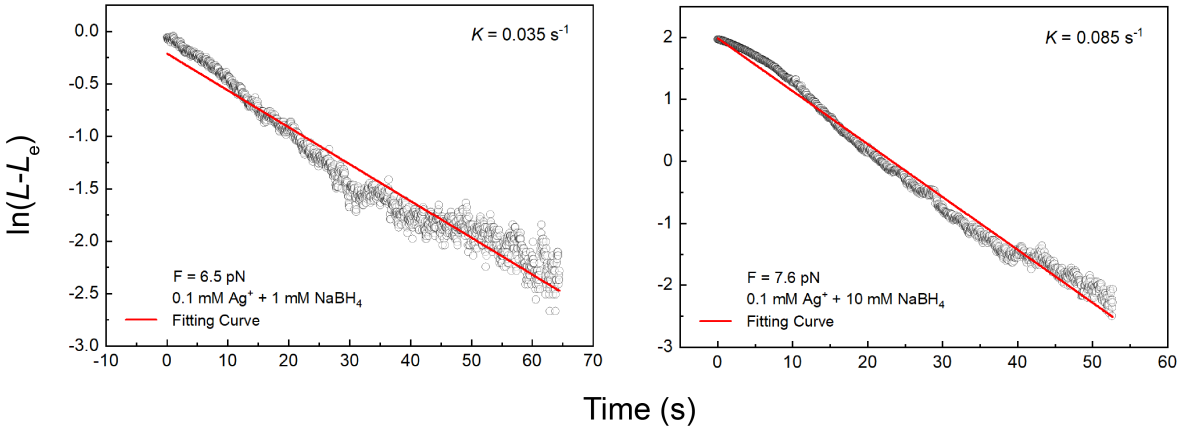

Figure S7 Plots of $\ln(L - L_e)$ as a function of time and the fitting curves using Eq.(10) under varying reductant concentrations.

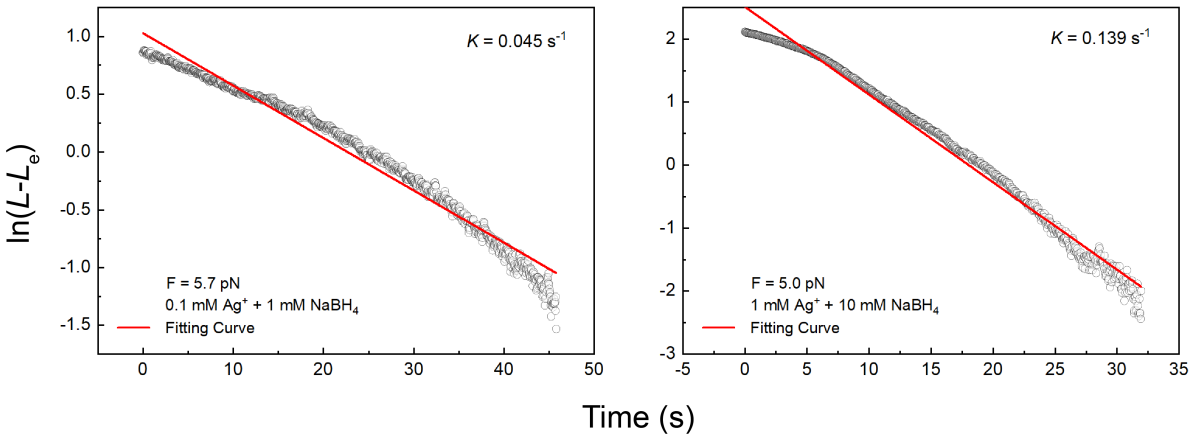

Figure S8 Plots of $\ln(L - L_e)$ as a function of time and the fitting curves using Eq.(10) under varying Ag^+ concentrations.

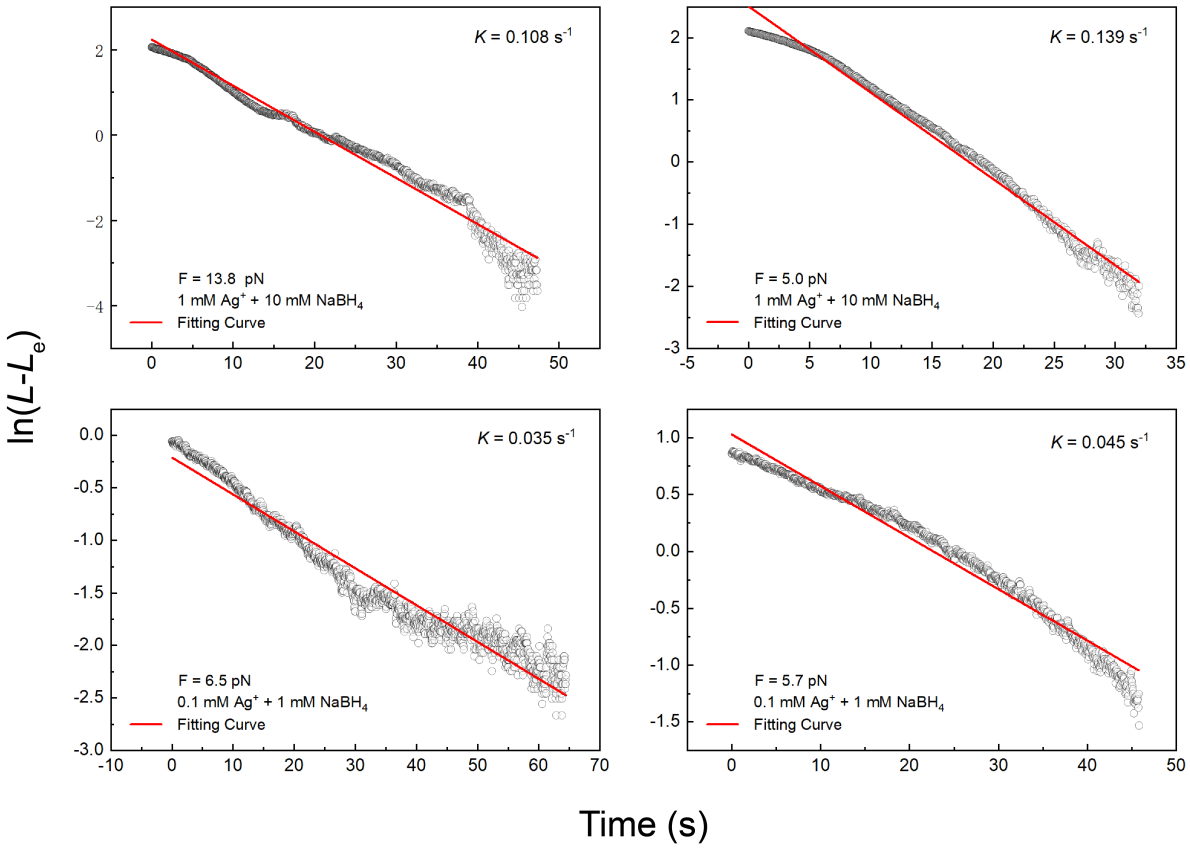

Figure S9 Plots of $\ln(L - L_e)$ as a function of time and the fitting curves using Eq.(10) under different forces.