

**Table S1.** Values of Randle's equivalent circuit elements for ds-DNA films. Parentheses show the standard deviation of the five measured results.

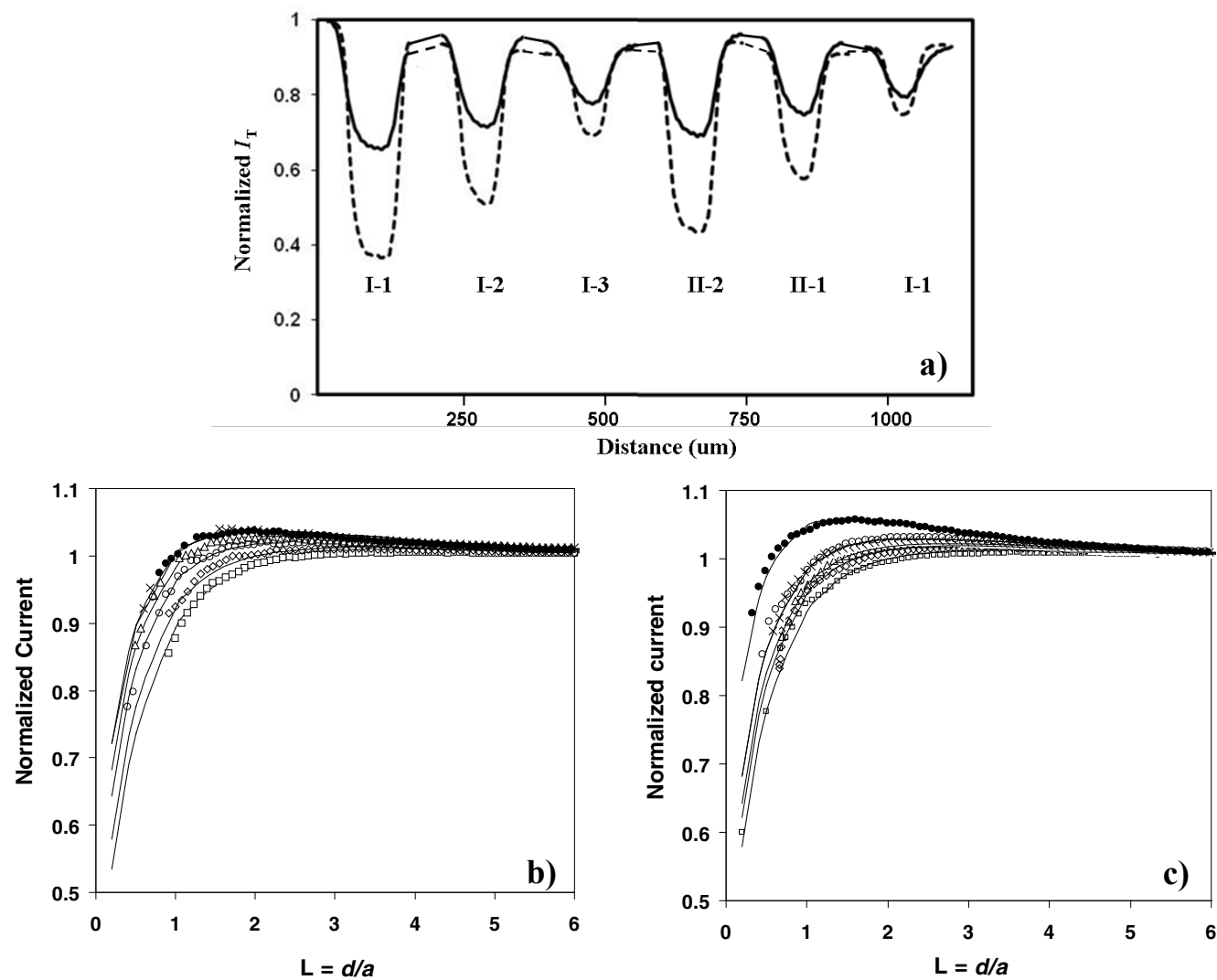
dsDNA	Match Type	Zn present/absent	$R_s$ ( $\Omega \cdot \text{cm}^2$ )	$C \cdot 10^{-6}$ ( $\text{F} \cdot \text{cm}^{-2}$ )	$R_{ct}$ ( $\text{k}\Omega \cdot \text{cm}^2$ )	$Q \cdot 10^{-5}$ ( $\text{S} \cdot \text{sec}^n \cdot \text{cm}^{-2}$ )	n	$R_x$ ( $\Omega \cdot \text{cm}^2$ )	$\Delta R_{ct}$ ( $\text{k}\Omega \cdot \text{cm}^2$ )
<b>I-1</b>	Matched	absent	0.1	1.8 (0.3)	4.4 (0.4)	1.4 (0.6)	0.90	2.4 (0.5)	2.6 (0.3)
		present	0.1	1.8 (0.1)	1.8 (0.2)	1.2 (0.3)	0.92	2.6 (0.6)	
<b>I-2</b>	Mismatched	absent	0.1	2.0 (0.3)	3.1 (0.7)	1.1 (0.3)	0.94	2.3 (0.1)	1.4 (0.3)
		present	0.1	2.1 (0.2)	1.7 (0.6)	1.0 (0.2)	0.95	2.5 (0.2)	
<b>I-3</b>	Mismatched	absent	0.1	2.2 (0.1)	2.3 (0.1)	1.7 (0.1)	0.94	1.9 (0.1)	1.0 (0.2)
		present	0.1	2.0 (0.1)	1.3 (0.3)	1.6 (0.1)	0.94	2.0 (0.1)	
<b>II-1</b>	Mismatched	absent	0.1	2.2 (0.2)	3.1 (1.0)	1.6 (0.1)	0.94	1.8 (0.2)	1.1 (0.4)
		present	0.1	2.3 (0.3)	2.0 (0.8)	1.5 (0.3)	0.95	1.8 (0.2)	
<b>II-2</b>	Matched	absent	0.1	2.1 (0.3)	7.0 (3.5)	1.2 (0.2)	0.91	2.0 (0.2)	3.0 (0.8)
		present	0.1	2.4 (0.9)	4.0 (3.1)	1.6 (0.5)	0.94	1.6 (0.1)	
<b>II-3</b>	Mismatched	absent	0.1	1.7 (0.3)	3.2 (0.6)	1.9 (0.6)	0.91	1.9 (0.5)	1.3 (0.2)
		present	0.1	1.9 (0.4)	1.9 (0.4)	1.6 (0.6)	0.94	2.0 (0.4)	

**Table S2.** Rate constants obtained from theoretical modeling of the experimental approach curves of the ds-DNA films before and after the addition of  $\text{Zn}^{2+}$ .

	Before Zn		After Zn	
	$K (10^{-2})^a$	$k^0 10^{-5} (\text{cm}\cdot\text{s}^{-1})^b$	$K$	$k^0 10^{-5} (\text{cm}\cdot\text{s}^{-1})$
<b>I-1</b>	5.5	2.4 $\pm$ 0.3	6.4	2.9 $\pm$ 0.1
<b>I-2</b>	9.0	4.0 $\pm$ 0.1	7.7	3.5 $\pm$ 0.1
<b>I-3</b>	8.4	3.7 $\pm$ 0.1	9.0	4.0 $\pm$ 0.05
<b>II-1</b>	9.9	4.4 $\pm$ 0.1	9.0	4.0 $\pm$ 0.1
<b>II-2</b>	6.4	2.8 $\pm$ 0.2	7.3	3.3 $\pm$ 0.2
<b>II-3</b>	10	4.5 $\pm$ 0.2	12	5.4 $\pm$ 0.1

a.  $K$  is a dimensionless rate constant obtained from curve fitting of the approach curves over dsDNA films.

b.  $k^0 = K \cdot D/a$ ; Diffusion coefficient,  $D = 5.6 \times 10^{-6} \pm 0.6 \text{ cm}^2/\text{s}$ ; area of the electrode,  $a = 0.0125 \text{ cm}$ .



**Figure S1.** (a) Current profile extracted from the ds-DNA spots before (solid) and after (dashed) addition of  $Zn^{2+}$ . Normalized Approach curves obtained before (b) and after (c) the addition of  $Zn^{2+}$  over individual homo and hetero ds-DNA films I-1( $\square$ ), I-2 ( $\Delta$ ), I-3 (o), II-1 ( $\times$ ), II-2 ( $\diamond$ ), II-3 ( $\bullet$ ).