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Electronic Supplementary Information

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Detection of DNA using Surface Enzymatic Transformations and Electrocatalytic Amplification

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Fig. S1. Analysis of PtNP size by transmission electron microscopy (TEM). (a) Representative TEM micrograph of the PtNPs used in this study. (b) Histogram showing the size distribution of the PtNPs: 22 ± 4 nm.



Fig. S2. Fluorescence calibration curve used to determine the coverage of ssDNA for the PtNP@ssDNA materials. The DNA coverage per PtNP was estimated to be ~35 DNAs per PtNP. This value applies to all experiments discussed in the main text except those associated with Fig. 2.



Fig. S3. ECA results for collisions of naked PtNPs with an Au UME. The solutions contained 50 mM PB + 10 mM N_2H_4 (pH 7). (a) *i*-*t* traces in the absence (black trace) and presence (colored traces) of 11.7 pM PtNPs. The average collision frequency for the three trials was 0.048 ± 0.006 Hz. (b) Histogram showing the frequency of collisions as a function of current. The average collision current was 51 ± 41 pA.



Fig. S4. Nanoparticle tracking analysis showing the normalized concentration of PtNPs as a function of their diameter for naked PtNPs (black traces) and PtNP@ssDNA (red traces) in (a) Taq buffer, (b) 20 mM (NH₄)₂SO₄, (c) 2.0 mM MgCl₂, (d) 75 mM Tris-HCl (pH 8.8), and (e) 0.01% Tween 20. (f) Histogram showing the average PtNP diameter in Taq buffer and the individual buffer components.



Fig. S5. ECA results for collisions of PtNP@ssDNA modified with the thiol linkage on the 3' end, post-Exo I digestion on Au (a) and Hg (b) UMEs. The solutions contained 50 mM PB + 10 mM N_2H_4 (pH 7). *i*-*t* traces in the absence (black traces) and presence (red traces) of 4 pM PtNPs@ssDNA, post-Exo I. No significant collision events were observed for either electrode material.

Table S1. Sizes of the PtNPs and PtNP@ssDNA in *Taq* buffer and *Taq* buffer components extracted from the nanoparticle tracking data in Fig. S4.

Solution	Naked PtNPs (nm)	PtNP@ssDNA (nm)
Taq buffer	155 ± 119	44 ± 40
20 mM (NH ₄) ₂ SO ₄	80 ± 67	54 ± 52
2 mM MgCl ₂	114 ± 99	46 ± 33
75 mM Tris-HCl	104 ± 75	69 ± 69
0.01% Tween 20	82 ± 78	60 ± 42