

## Supporting Information

### **RNA Aptamer-Based Electrochemical Biosensor for Selective and Label-Free Analysis of Dopamine**

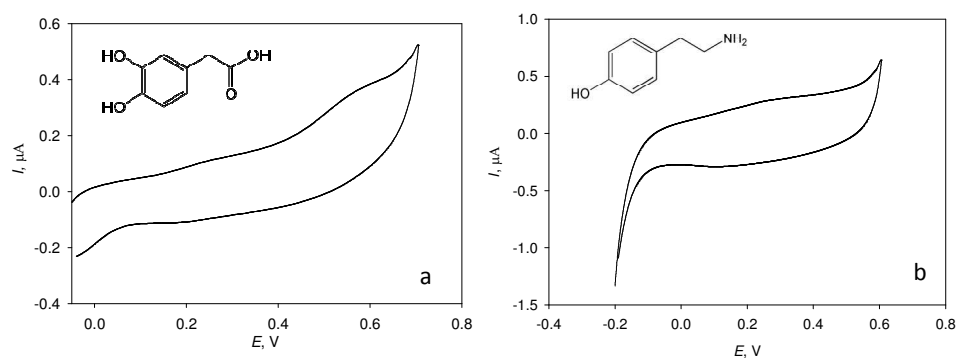
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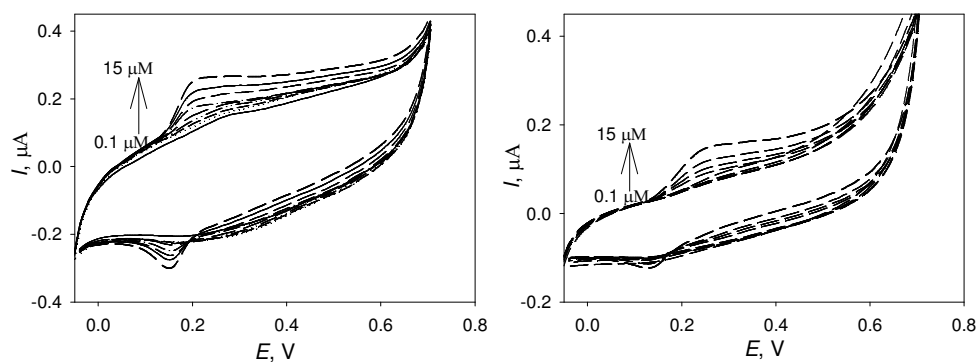
<sup>b</sup> *Department of Molecular Biology and Genetics, Aarhus University, Denmark;*

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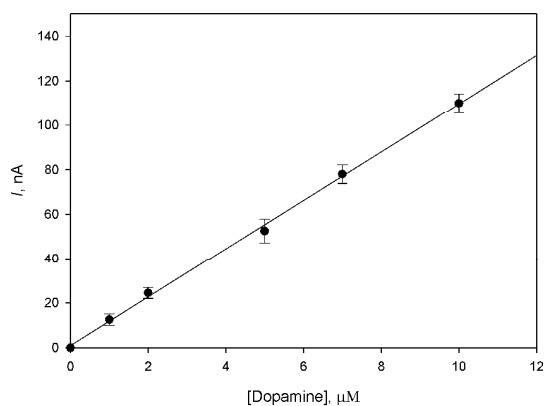
## Figures



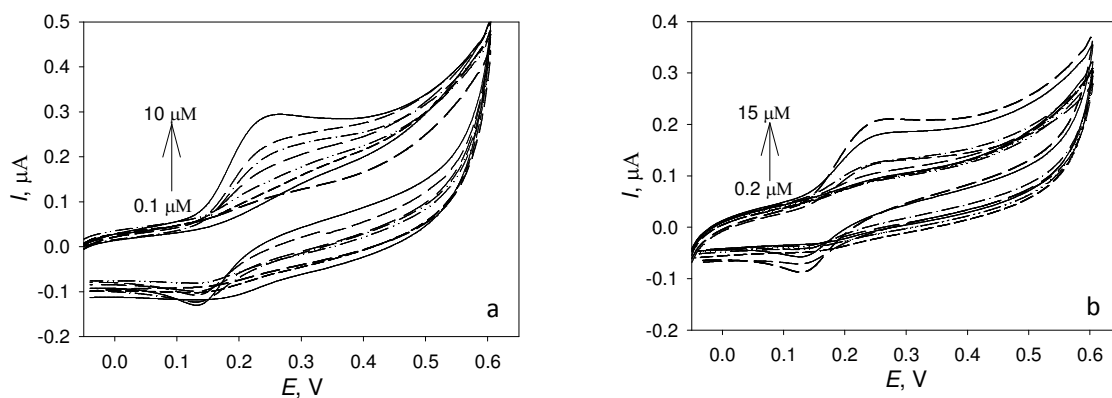
**Figure S1.** Representative CVs of 30  $\mu\text{M}$  (a) DOPAC and (b) tyramine at Au electrodes, potential scan rate 0.1  $\text{V s}^{-1}$ .



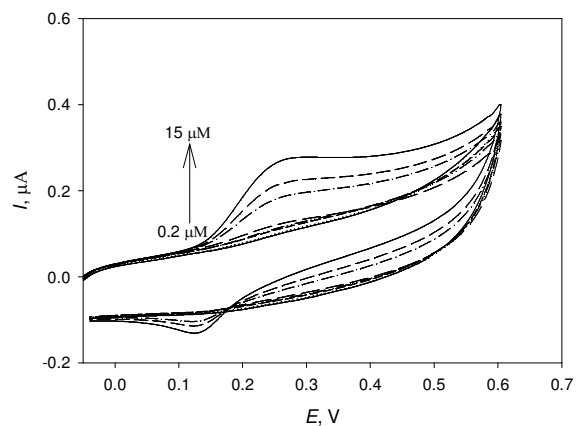
**Figure S2.** Representative CVs of dopamine at (a) bare Au, (b) cysteamine-modified Au electrodes, dopamine concentrations: 0, 0.1, 0.5, 1, 2, 5, 7, 10, and 15  $\mu\text{M}$ , pH 7.4, the potential scan rate is 50  $\text{mV s}^{-1}$ .



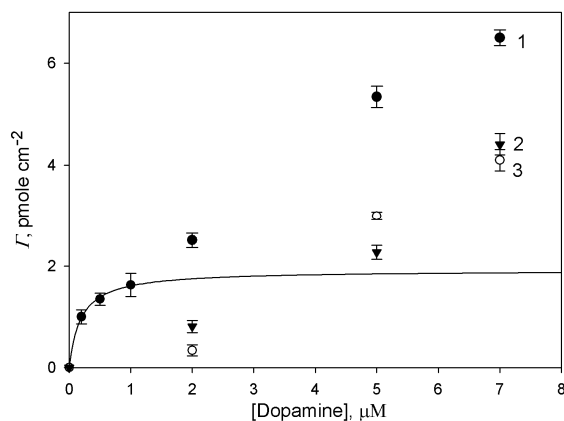
**Figure S3.** Calibration curve for dopamine detection at the bare Au electrodes, based on the dependence of the CV peak currents of dopamine oxidation on concentration of dopamine. Dopamine detection limit was 1  $\mu\text{M}$  dopamine.



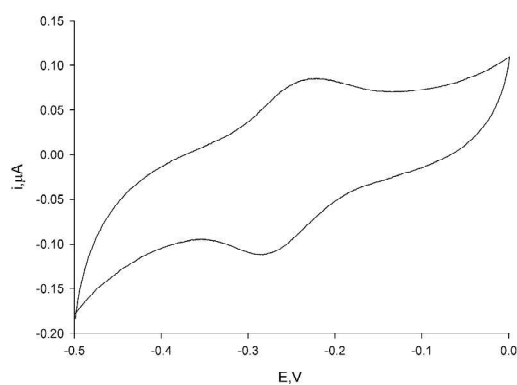
**Figure. S4.** Representative CVs of (a) the Dop\_RNA aptamer/Cys/Au electrode in the presence of 0, 0.1, 0.2, 0.5, 1, 2, 5, 7, 10  $\mu\text{M}$  dopamine, and (b) the Mut\_apptamer/Cys/Au electrode in the presence of 0, 0.2, 0.5, 1, 2, 5, 7, 10, 15  $\mu\text{M}$  dopamine. Potential scan rate is  $50 \text{ mVs}^{-1}$ .



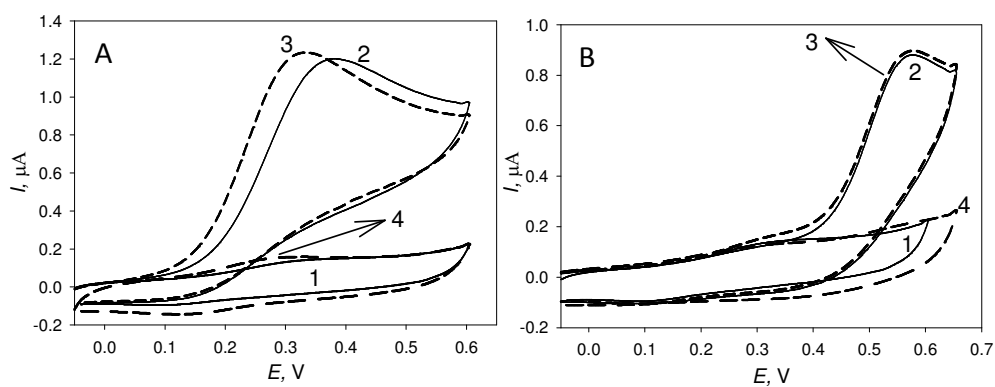
**Figure. S5.** Representative CVs of dopamine at cysteamine-modified Au electrodes, additionally modified with 20 nts DNA sequence of the arbitrary composition (not aptamer). Dopamine concentrations: 0, 0.2, 0.5, 1, 2, 5, 7, 10, and 15  $\mu\text{M}$ , PBS, pH 7.4, potential scan rate  $50 \text{ mV s}^{-1}$ .



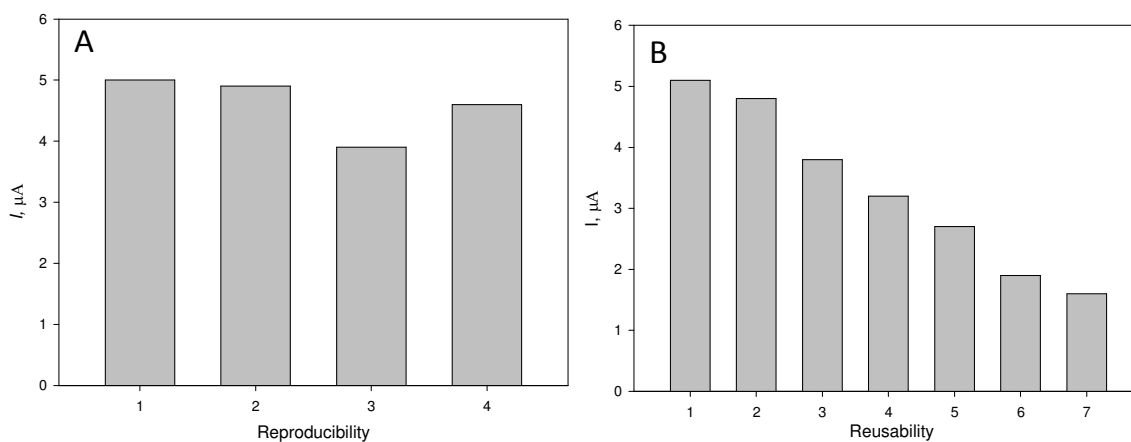
**Figure S6.** Presumable surface coverage of the RNA aptamer estimated by integration of the dopamine peak in CV measured at different concentrations of dopamine at differently modified electrodes: (1) Dopa\_RNA aptamer/cysteamine/Au, (2) arbitrary DNA/cysteamine/Au (20nts) and (3) Dopa\_Mut\_apptamer/cysteamine/Au.



**Figure S7.** Representative CV recorded with the MB-labeled aptamer-modified electrode, scan rate  $50 \text{ mV s}^{-1}$ .



**Figure S8.** (A) Representative CV recorded with the aptamer-modified electrodes in solutions of (1)  $5 \mu\text{M}$  dopamine, (2)  $0.3\text{mM}$  AA, (3)  $5 \mu\text{M}$  dopamine and  $0.3\text{mM}$  AA, and (4)  $5 \mu\text{M}$  dopamine and  $0.3\text{mM}$  AA with the electrode covered by the Nafion membrane. (B) Similar data for UA.



**Figure S9.** Reproducibility of the CV oxidation signal from the Dopa\_RNA aptamer-modified electrodes in the presence of  $5 \mu\text{M}$  dopamine for (A) four individual electrodes and (B) a single electrode in the course of continuous measurements, the electrode was regenerated by successive washing with water.

**Table S1.** DNA sequences and produced RNAs in the present work

Name	Sequences (5'...3')
Dopa_RNA aptamer <sup>a</sup>	GUCUCUGUG <b>UGCGCC</b> CAGAGACAGUGGGGCAGAU AUGGGC CAG <b>CAC</b> AGAAUGAGGCC
EcoRI_T7_DopaMut_Apt_F <sup>b,c</sup>	TATAGAATTCTAATACGACTCACTATAGGTCTCTGTGTGCaa CAGAGAACACTGGGGCAGATAT
DopaMut_Apt_R	GGGCCggATTCTGTGCgGGCCCATATCTGCCCCAGTGTTC
Dopa_RNA Mut_apramer <sup>a,b</sup>	GGUCUCUGUG <b>UGC</b> aaCAGAGAACACUGGGGCAGAU AUGGG CCc <b>GCAC</b> AGAAUccGGCCC
<sup>a</sup> Domains responsible for dopamine binding are indicated in bold letters; <sup>b</sup> Primers used: T7 promoter sites are underlined; <sup>c</sup> Mutations are indicated by lower case letters.	