Supporting Information

Catecholamine Detection Using a Functionalized Poly(L-dopa)-Coated Gate Field-Effect Transistor

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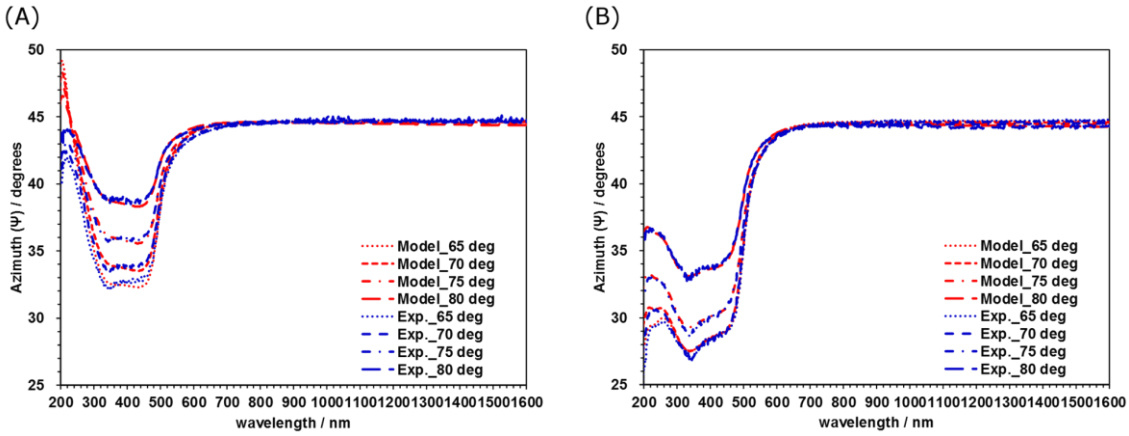

Figure S1. Ellipsometric spectra for the modified Au surfaces by electropolymerization: (A) poly(LD)-coated Au surface and (B) poly(PBA-LD/LD)-coated Au surface. Azimuth (Ψ) was measured in the range from 200 nm and 1600 nm wavelength. Blue lines indicated the experimental spectra of each step of modified Au surface for each incident light angle, and red lines showed model fitted spectra from each experimental spectrum by using WVASE32 software. Each dotted line corresponded to the spectra of the incidence angle 65˚, 70˚, 75˚ and 80˚, respectively.

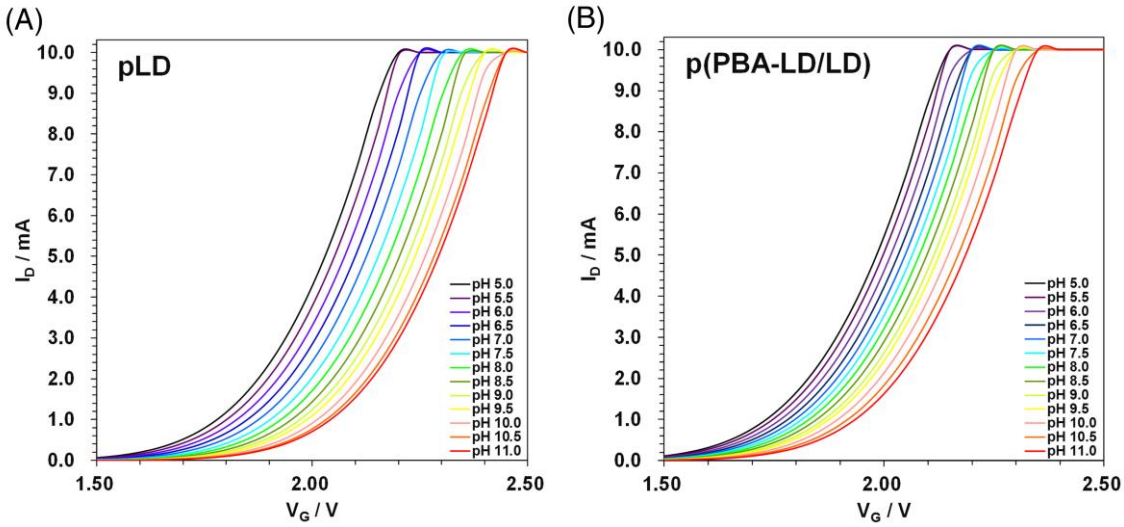

Figure S2. I_D-V_G curve of (A) poly(LD)-coated gate FET and (B) poly(PBA-LD/LD)-coated gate FET at different pH from 5 to 11.

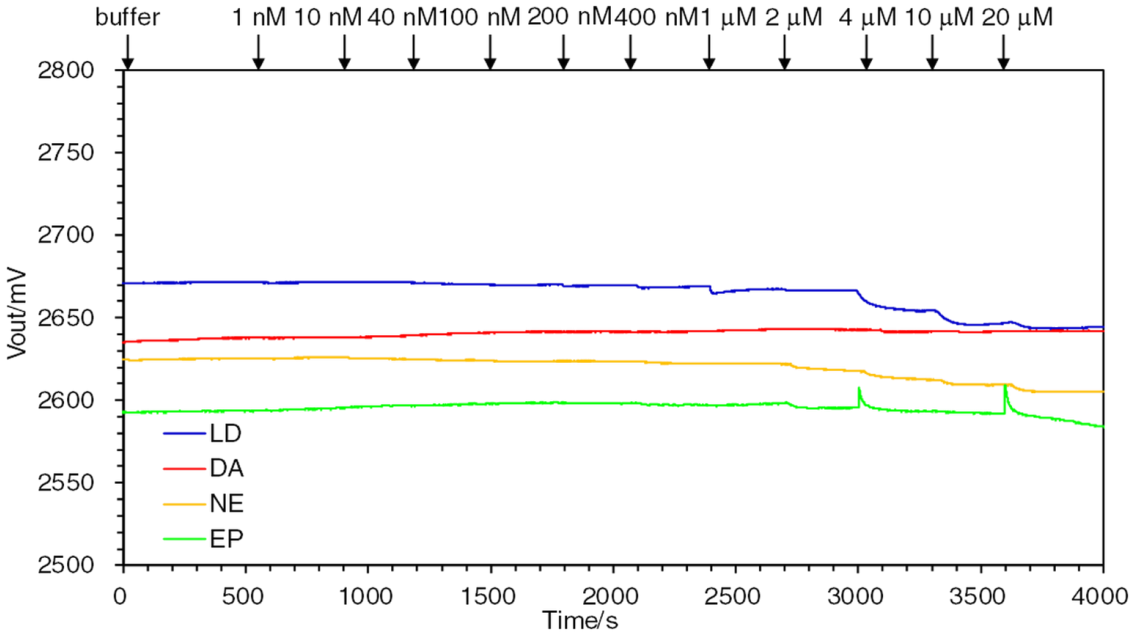

Figure S3. Time course for V_{out} of poly(LD)-coated gate FET at different concentrations of CAs at a constant source-drain current (100 μA). Arrows indicate time and final concentration of CA addition. V_{out} of poly(LD)-coated gate FET upon LD addition (blue line), DA addition (red line), NE addition (orange line), and EP addition (green line).

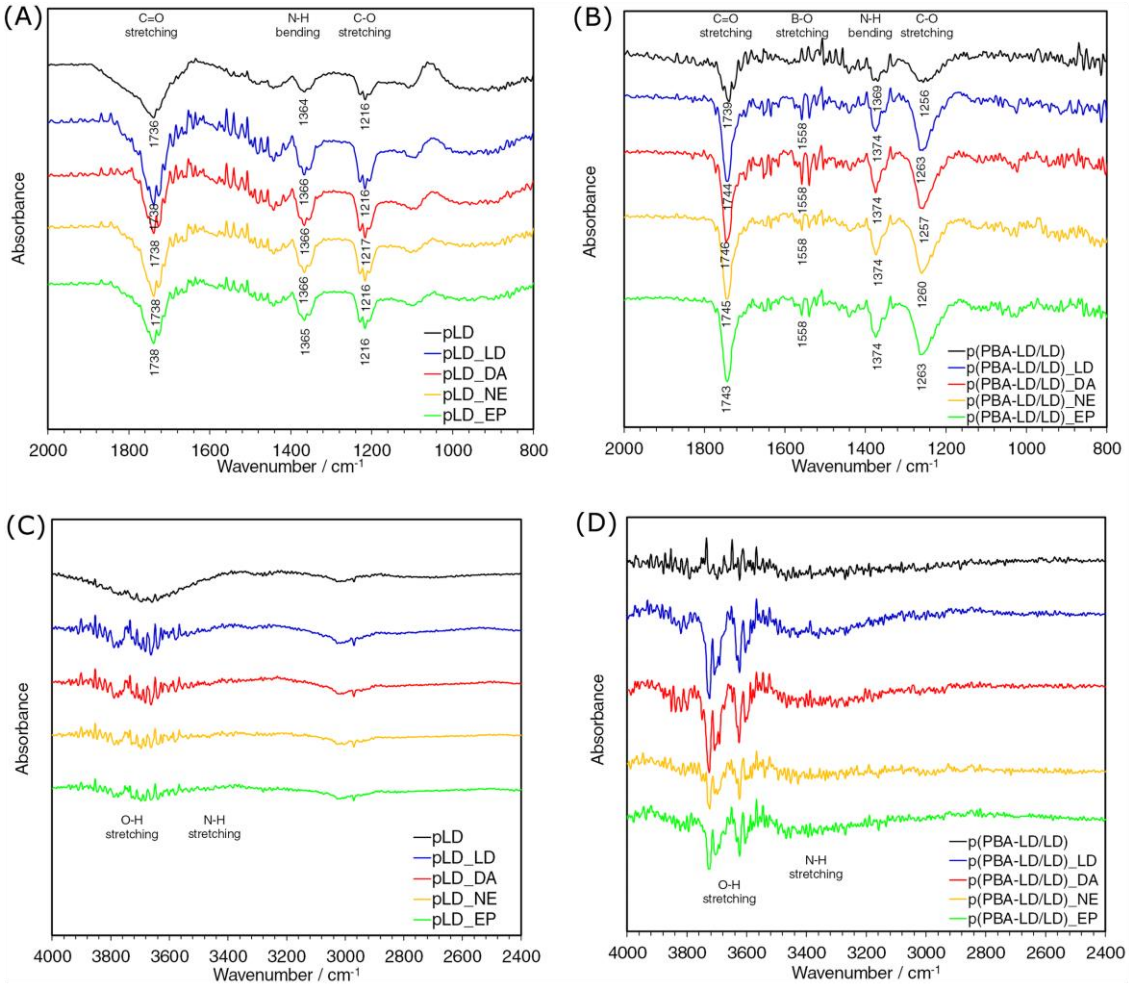

Figure S4. ATR-FTIR spectra of poly(LD)-coated Au electrode (A and C), and poly(PBA-LD/LD)-coated Au electrode (B and D) at each CA addition (Black: without CA, blue: LD, red: DA, orange: NE, green: EP).

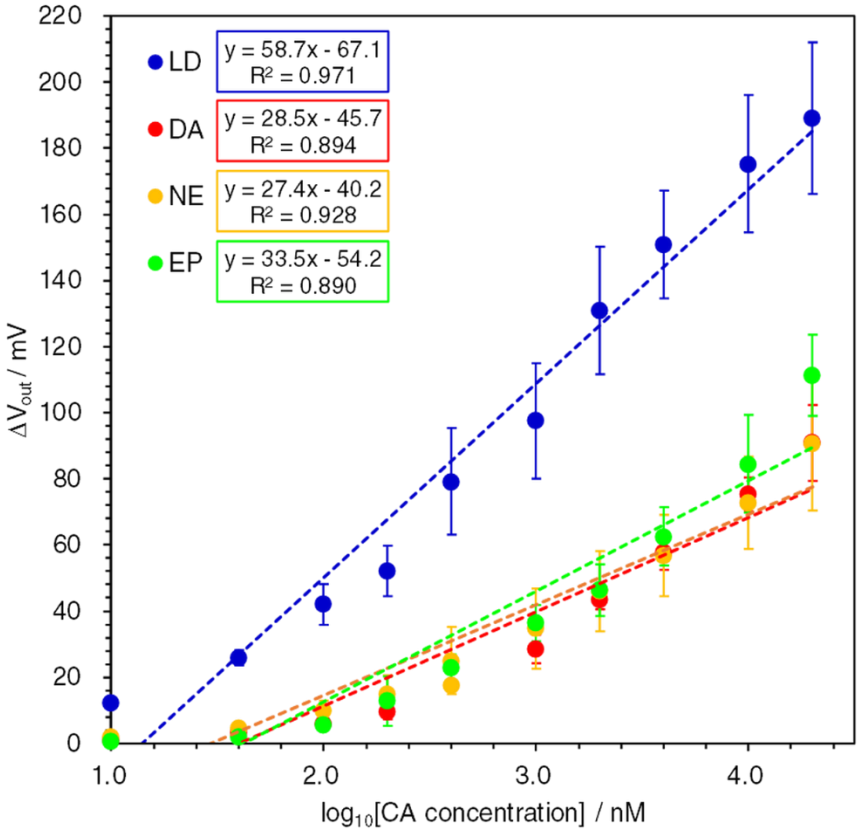

Figure S5. Semi-logarithmic plots between ΔV_{out} in poly(PBA-LD/LD)-coated gate FET and CA concentration from 10 nM to 20 μM. Dotted lines indicate linear approximations of the plots at each catecholamine addition.

Table S1. Comparison with other sensors for the determination of catecholamine and catechol.

Interface materials	Detection method	Target substance	Dynamic range/M	Limit of detection/nM	reference
Phosphate-TiO_2	Fluorescence	LD, DA, NE, EP	5.0×10^{-7}–5.0×10^{-4}	3.4–9.2×10^{-8}	Wu et al. (2007)[1]
MWCNT-MIP-GCE[a]	Cyclic voltammetry	DA	5.0×10^{-7}–2.0×10^{-4}	5.0×10^{-7}	Kan et al. (2008)[2]
MIP-Au	Cyclic voltammetry	DA	2.3×10^{-7}–1.4×10^{-4}	2.3×10^{-7}	Lakshmi et al. (2009)[3]
MIP-Au	Cyclic voltammetry	DA	2.0×10^{-8}–2.5×10^{-7}	2.0×10^{-9}	Li et al. (2009)[4]
GO[b]-MIP-GCE	Cyclic voltammetry	DA	1.0×10^{-7}–8.3×10^{-4}	1.0×10^{-7}	Mao et al. (2011)[5]
Au@SiO2MIPs-GCE	Cyclic voltammetry	DA	4.8×10^{-8}–5.0×10^{-5}	2.0×10^{-8}	Yu et al. (2012)[6]
MWCNT-pPyMIP[c]-GCE	Cyclic voltammetry	DA	6.3×10^{-7}–1.0×10^{-4}	6.0×10^{-8}	Kan et al. (2012)[7]
MIP-GO-GCE	Cyclic voltammetry	DA	5.0×10^{-8}–1.6×10^{-4}	3.0×10^{-8}	Zeng et al. (2013)[8]
CD-Lac[d]	Fluorescence	LD, DA, EP	1.5×10^{-7}–1.3×10^{-4}	6.2×10^{-8}	Li et al. (2015)[9]
PBA-CD	Fluorescence	catechol	1.0×10^{-7}–5.6×10^{-6}	1.2×10^{-7}	Ye et al. (2017)[10]
pLDNP[e]	Fluorescence	LD	3.0×10^{-7}–1.0×10^{-4}	2.9×10^{-8}	Reza Hormozi-Nezhad et al. (2017)[11]
p(PBA-LD/LD)-Au	FET	LD, DA, NE, EP	1.0×10^{-9}–2.0×10^{-5}	3.5–12.6×10^{-9}	This work

a: multi-walled carbon nanotube-molecularly imprinted polymer-glassy carbon electrode, b: graphene oxide, c: polypyrrole MIP, d: N-doped carbon dot-Laccase, e: poly(L-dopa) nano-particle.

Reference

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