Electronic Supplementary Information

Highly sensitive and simply operated protease sensor toward point-of-care testing

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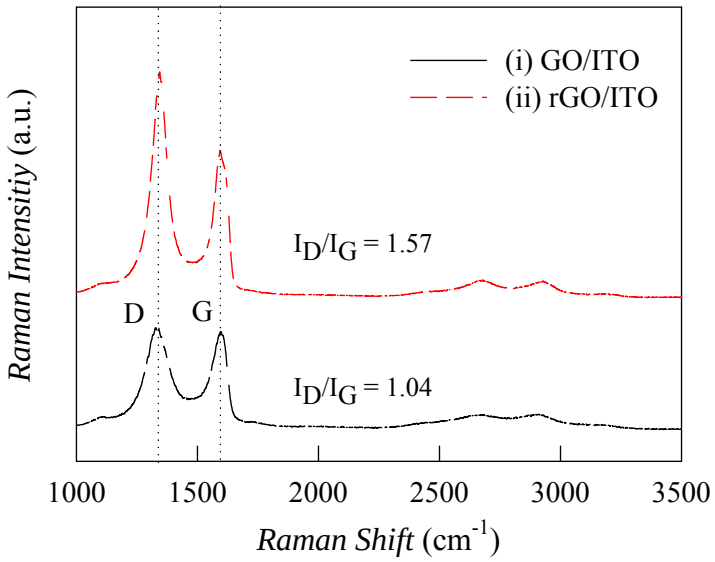

Fig. S1 Raman spectra of (i) GO/ITO and (ii) rGO/ITO electrodes.

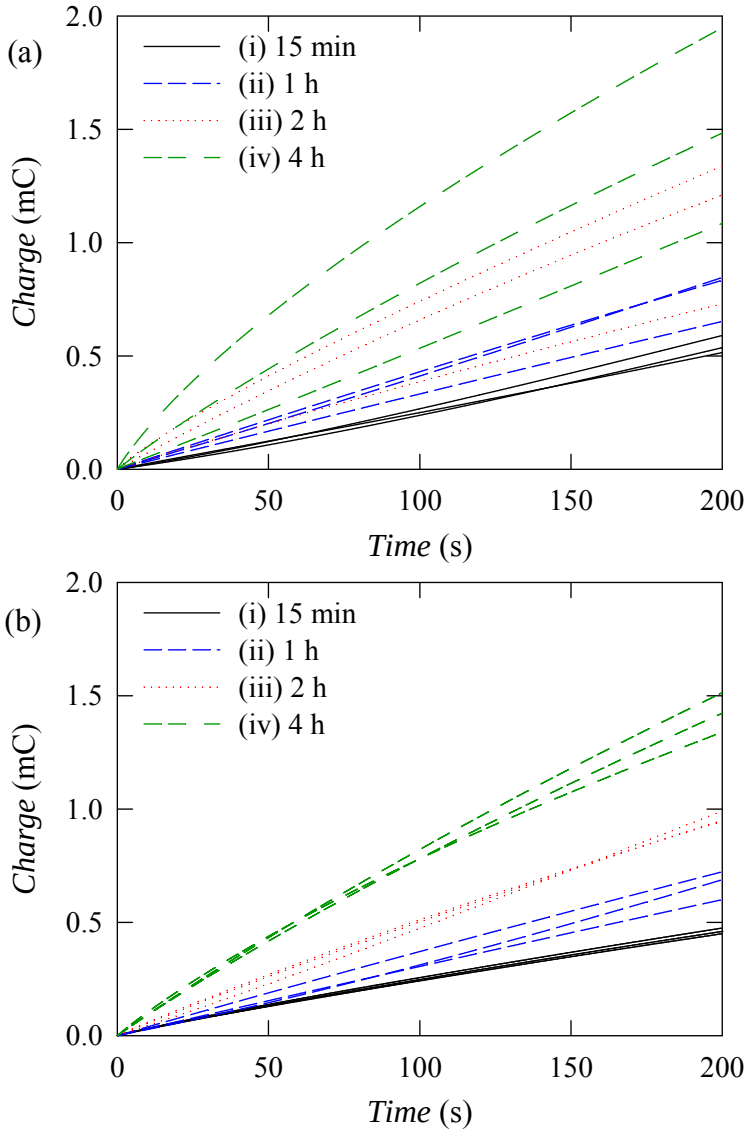

Fig. S2 Chronocoulograms obtained at 0.30 V at (a) rGO/ITO electrodes and (b) avidin/rGO/ITO electrodes after incubation periods of (i) 15 min, (ii) 1 h, (iii) 2 h, and (iv) 4 h at 37 °C in PBS solution containing 0.1 mM oligopeptide-AP, 2.0 mM DTT, 10 μg/mL BoNT/E-LC, and 10 μg/mL LAP.

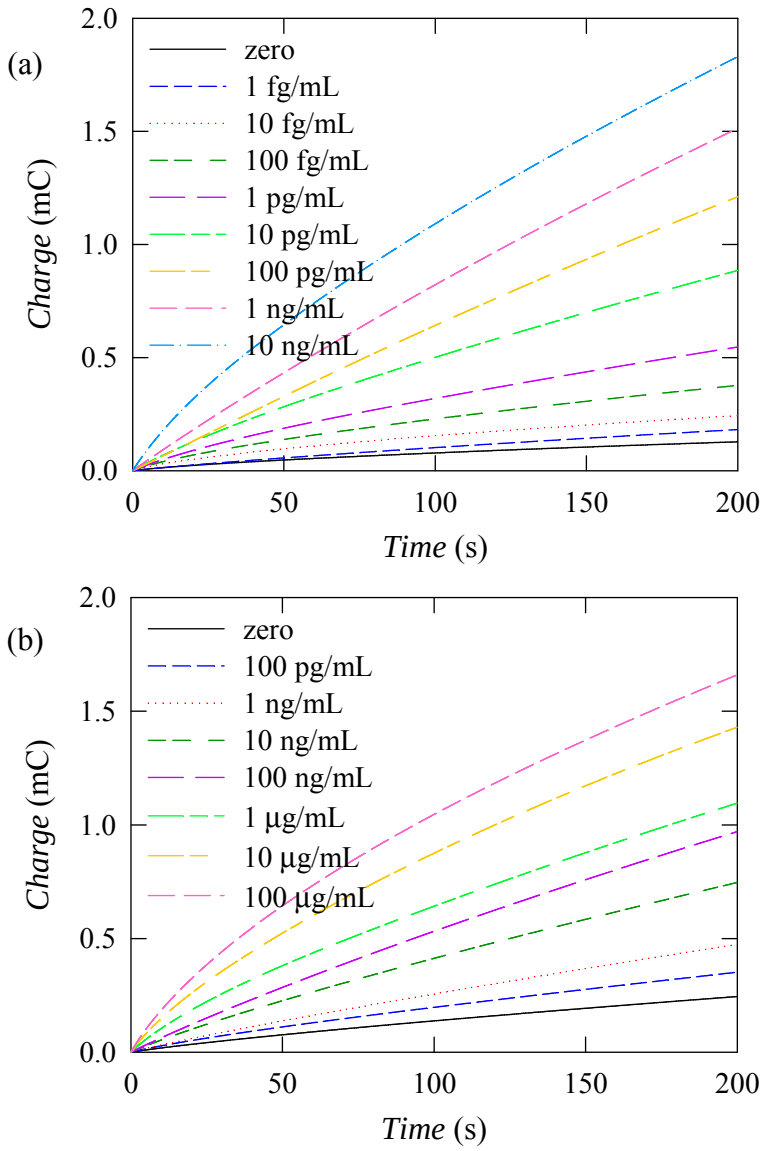

Fig. S3 (a) Chronocoulograms obtained at 0.30 V at avidin/rGO/ITO electrodes after incubation periods of (a) 4 h and (b) 15 min at 37 °C in PBS solution containing different concentrations of BoNT/E-LC. The final solutions for electrochemical measurement contained 2.0 mM DTT, 0.1 mM oligopeptide-AP and 10 µg/mL LAP.

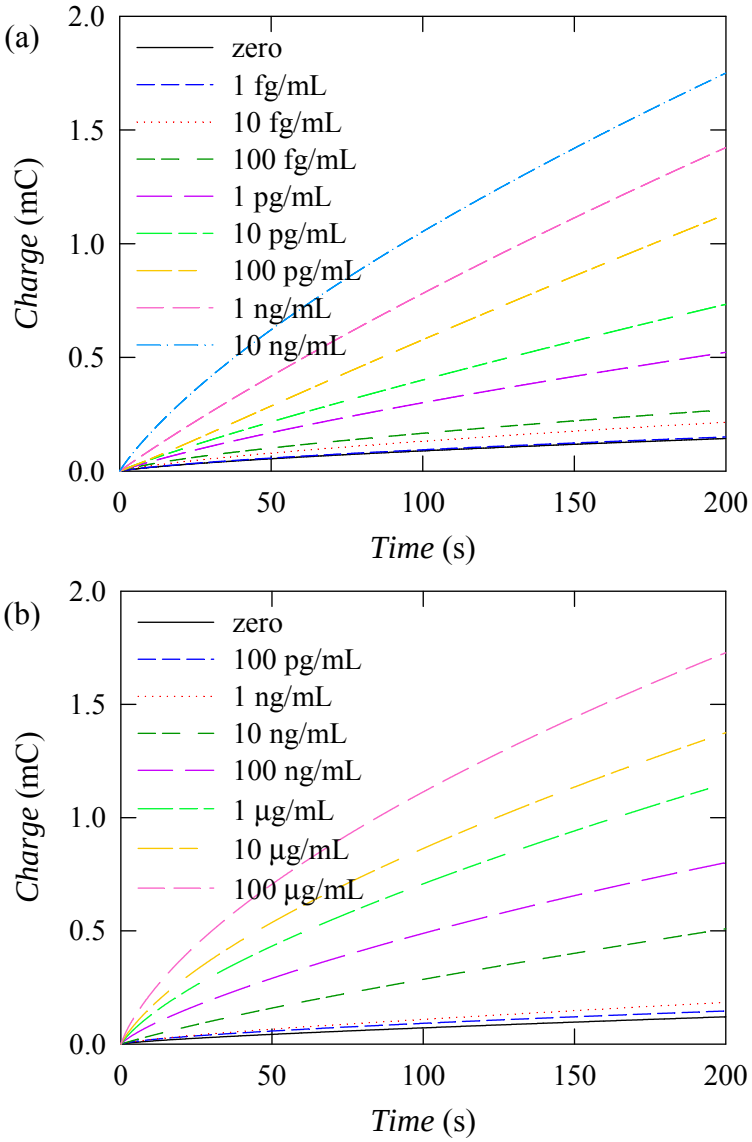

Fig. S4 (a) Chronocoulograms obtained at 0.30 V at avidin/rGO/ITO electrodes after incubation periods of (a) 4 h and (b) 15 min at 37 °C in commercial bottled water containing different concentrations of BoNT/E-LC. The final solutions for electrochemical measurement contained 2.0 mM DTT, 0.1 mM oligopeptide-AP and 10 µg/mL LAP.

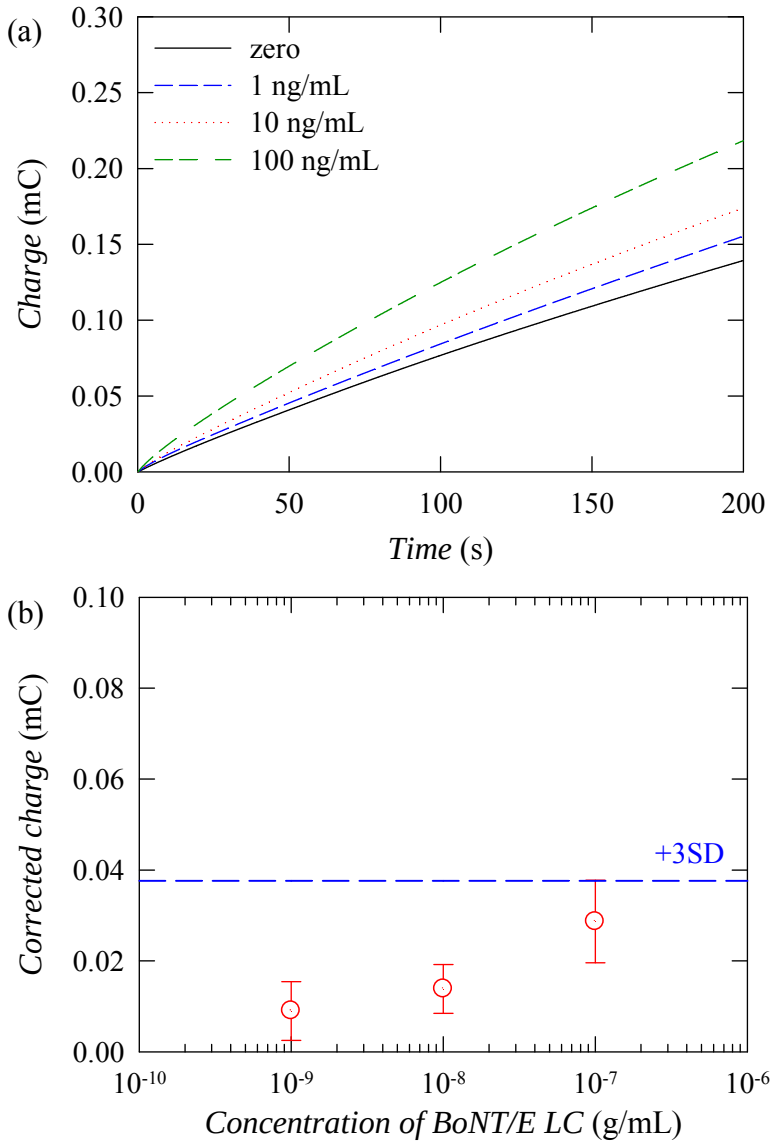

Fig. S5 (a) Chronocoulograms obtained at 0.05 V at ITO electrodes after an incubation period of 15 min at 37 °C in PBS solution containing different concentration of BoNT/E-LC, and the final solutions for electrochemical measurement contained 1.0 mM $Ru(NH_3)_6^{3+}$, 2.0 mM DTT, 0.1 mM oligopeptide-AP and 10 µg/mL LAP. (b) Calibration plot for the charge at 100 s of the chronocoulograms of panel a.

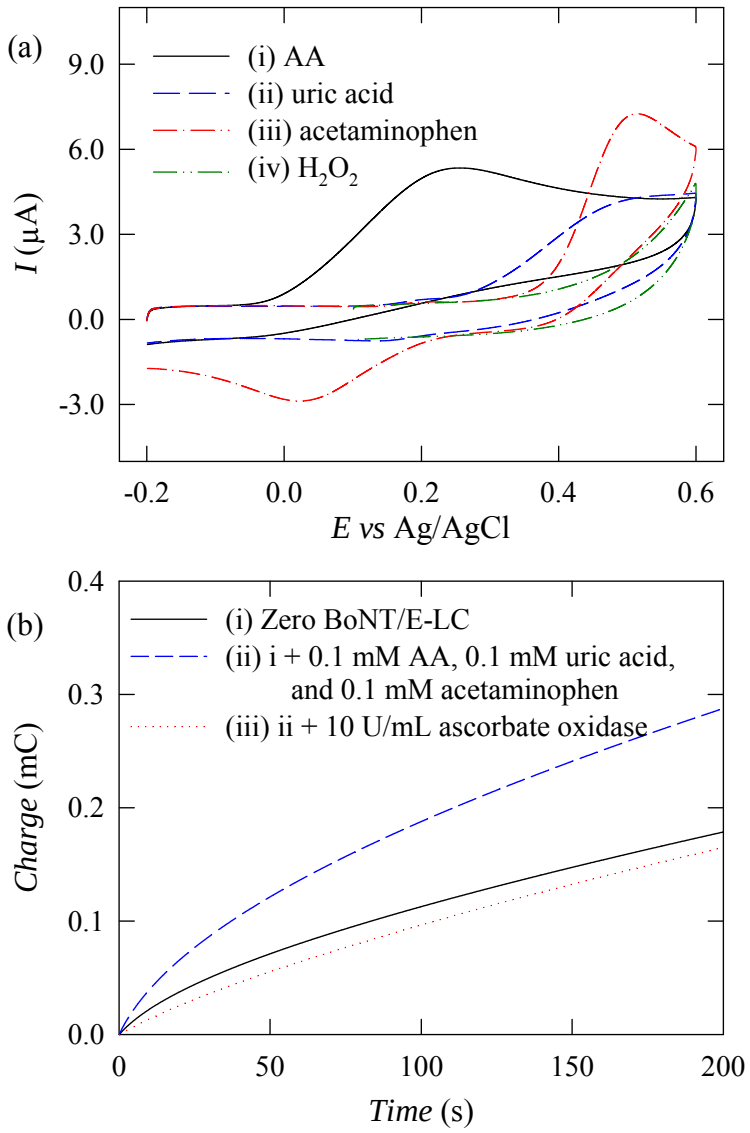

Fig. S6 (a) Cyclic voltammograms obtained at a scan rate of 50 mV/s at avidin/rGO/ITO in a PBS solution containing (i) 0.1 mM ascorbic acid (AA), (ii) 0.1 mM uric acid, (iii) 0.1 mM acetaminophen, and (iv) 0.1 mM H_2O_2. (b) Chronocoulograms obtained at 0.30 V at avidin/rGO/ITO electrodes after incubation periods of 15 min at 37 °C in PBS solution containing (i) 0.1 mM oligopeptide-AP, 2.0 mM DTT, and 10 μg/mL LAP, (ii) 0.1 mM oligopeptide-AP, 2.0 mM DTT, 10 μg/mL LAP, 0.1 mM AA, 0.1 mM uric acid, and 0.1 mM acetaminophen, and (iii) 0.1 mM oligopeptide-AP, 2.0 mM DTT, 10 μg/mL LAP, 0.1 mM AA, 0.1 mM uric acid, 0.1 mM acetaminophen, and 10 U/mL ascorbate oxidase.

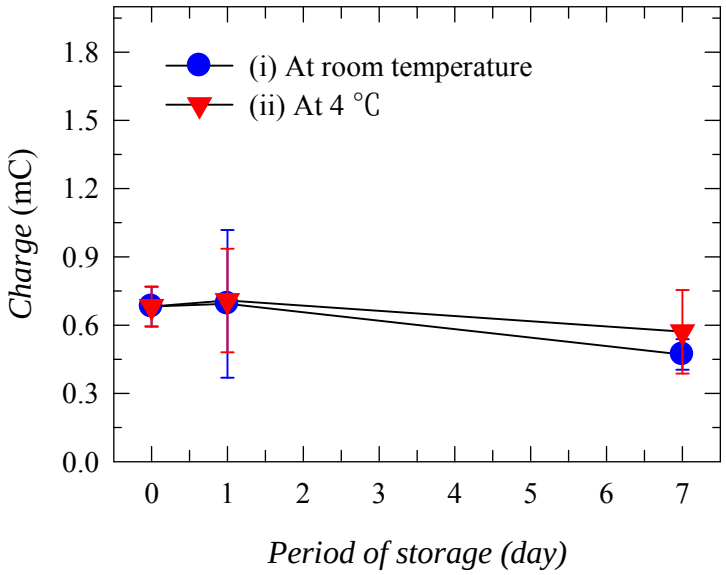

Fig. S7 Charges measured at 100 s in the chronocoulograms obtained at 0.30 V after an incubation period of 15 min at 37 °C in PBS solutions containing 0.1 mM oligopeptide-AP, 2.0 mM DTT, 1 μg/mL BoNT/E-LC, and 10 μg/mL LAP at the avidin/rGO/ITO electrodes stored for 0, 1, and 7 days at room temperature and at 4 °C. All experiments were conducted using 3 different electrodes for each sample.