Supporting Information

Layer-by-Layer Assembled Enzyme Multilayers with Adjustable Memory Performance and Low Power Consumption *via* Molecular-Level Control

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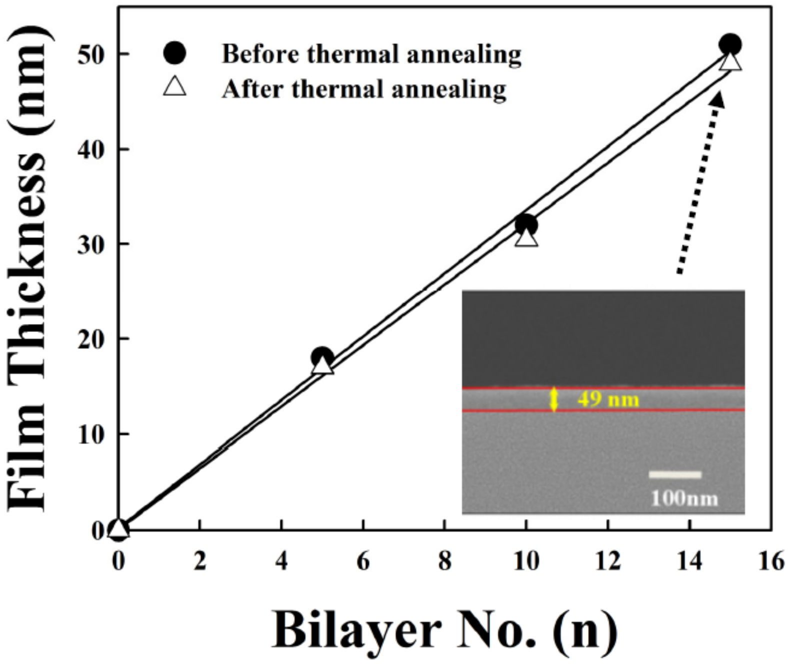

Figure S1. Film thicknesses of $(PAH/CAT)_{n=5,10 \text{ and } 15}$ multilayers measured from cross-sectional SEM images before and after thermal annealing at 150 °C for 1 hr. The inset indicates cross-sectional SEM image of 15 bilayered films after thermal drying.

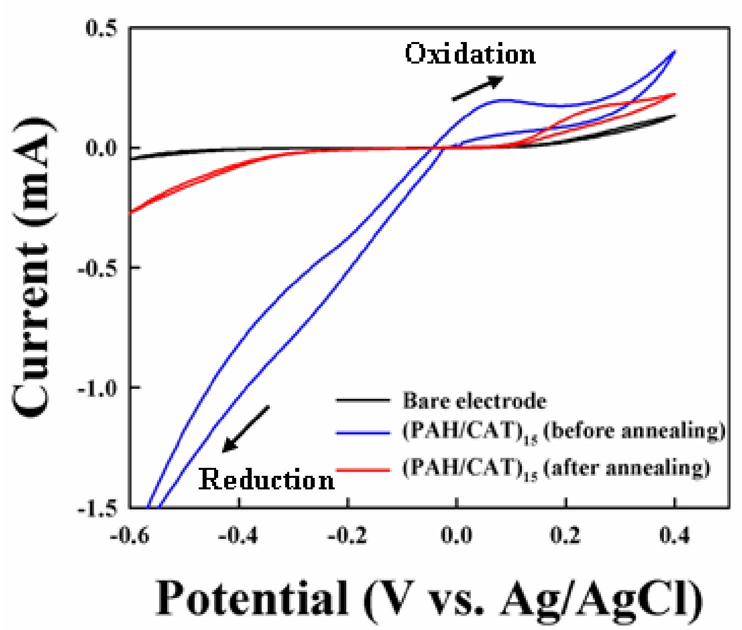

Figure S2. Cyclic voltammograms of bare gold electrode and $(PAH/CAT)_{15}$ multilayer-coated onto electrode in pH 7.0 PBS containing 21 mM H_2O_2 with scan rate = 0.05 $V{\cdot}s^{-1}$. Redox reaction of PAH/CAT multilayers is occurred from the following reactions: (1) $CAT\text{-}Fe^{III} + H_2O_2 \rightarrow [CatalaseFe^{IV}{=}O]^* + H_2O$, (2) $[CatalaseFe^{IV}{=}O]^* + H_2O_2 \rightarrow CatalaseFe^{III} + O_2 + H_2O$.

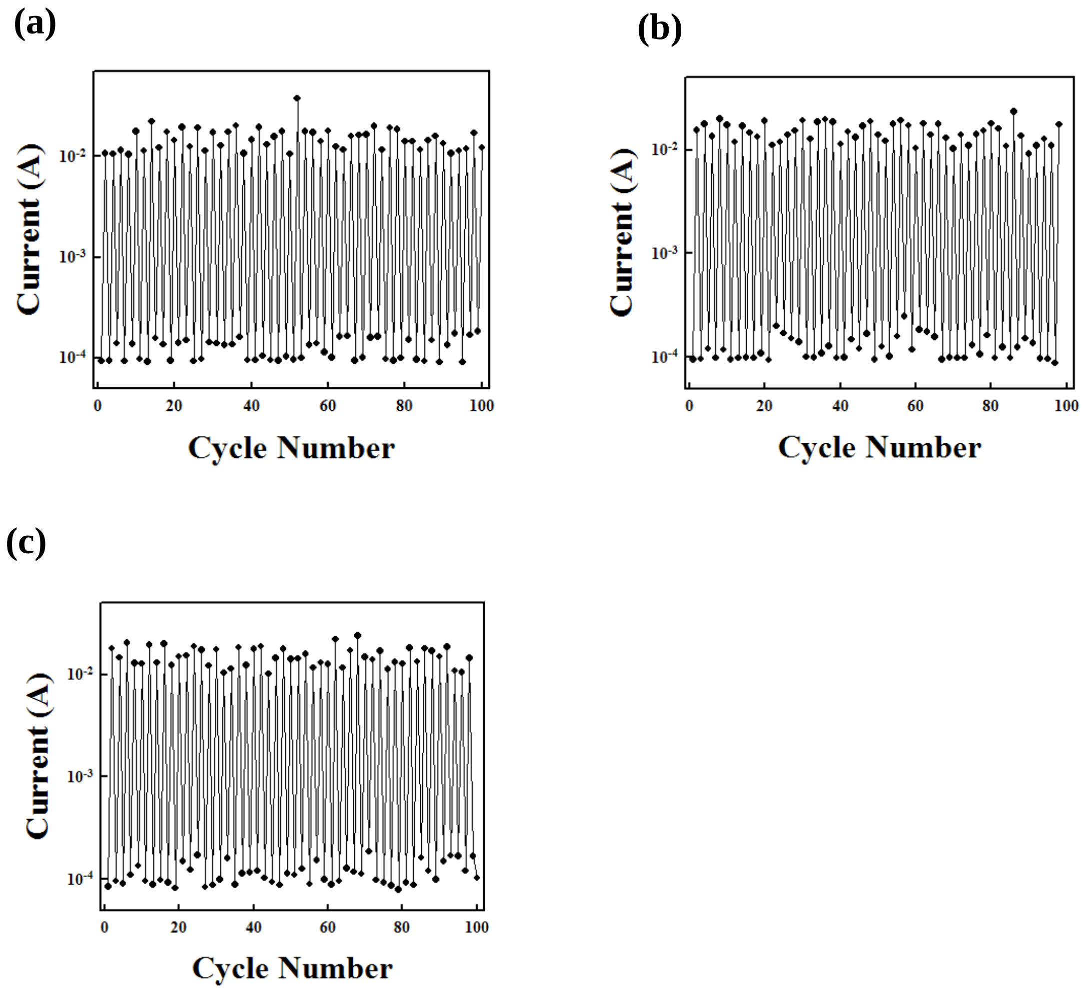

Figure S3. Cycling tests of $(PAH/CAT)_{15}$ multilayers. The electrical measurements were operated at an applied voltage pulse with (a) 300, (b) 500 and (c) 1 μs width in the air environment.

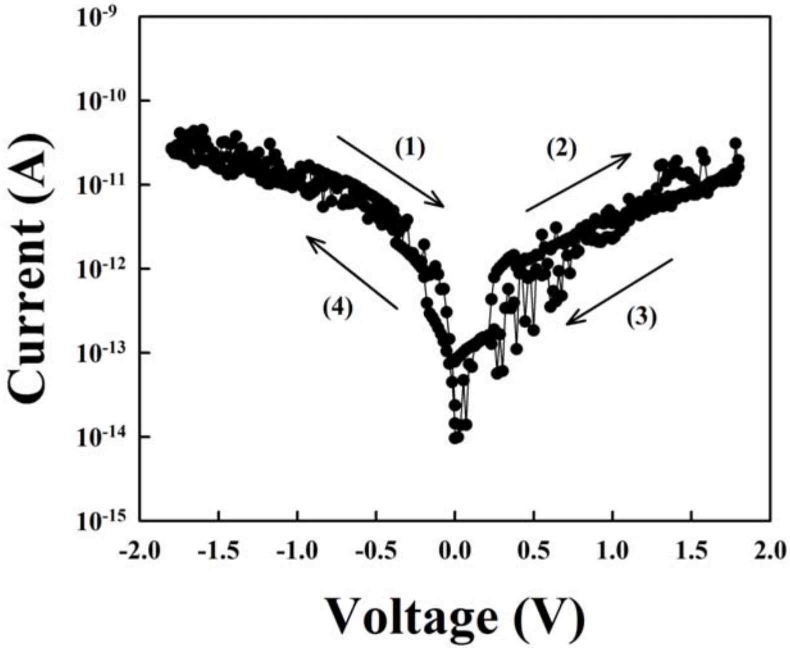

Figure S4. *I*-*V* characteristics of (PAH/poly(acrylic acid) (PAA))$_{10}$ composed of insulating polyelectrolytes. Top and bottom electrodes were Pt and Ag electrodes.

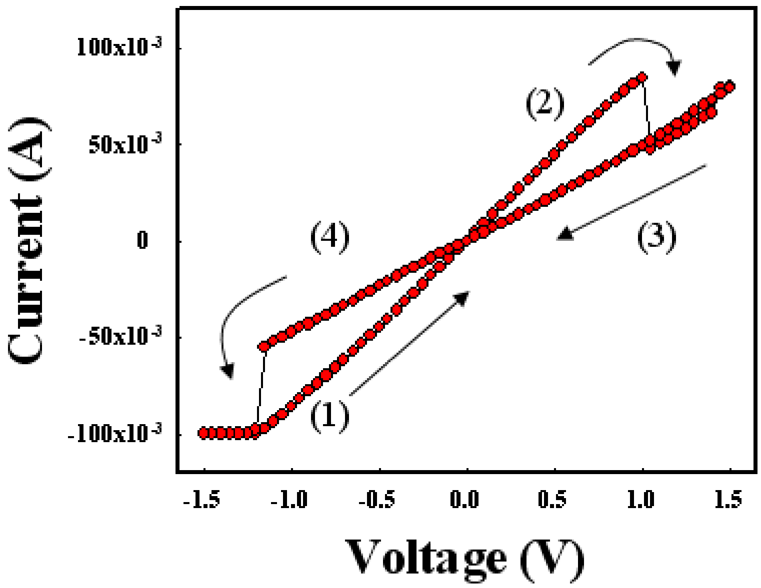

Figure S5. *I-V* curve of (haemoglobin/PSS)$_{15}$ multilayers measured from tungsten tip electrode. The electrical measurements were operated at an applied voltage pulse with a 1μs width in the air environment.