Supporting Information

Highly Sensitive Electrochemical Detection of Proteins using Aptamer-Coated Gold Nanoparticles and Surface Enzyme Reactions

Eun Ji Nam[a], Eum Ji Kim[a], Alastair W. Wark[b], Sangchul Rho[c], Hyungi Kim[c] and Hye Jin Lee[a]*

Figure S1. A series of cyclic voltammograms for 20 fM IgE detection at different scan rates of 20, 50 and 100 mV/s using an aptamer-nanoparticle conjugate modified gold electrode with APL-anti-IgE and APP (Scheme A in Figure 1). The APP concentration was fixed at 60 μM.

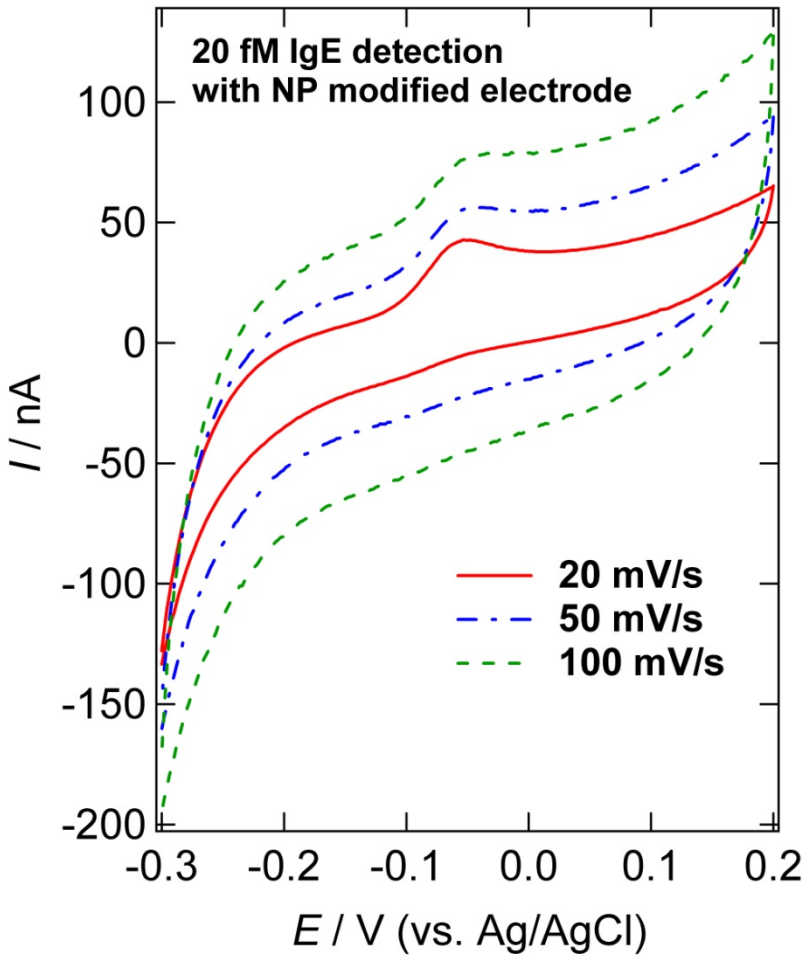

Figure S2. (a) Representative cyclic voltammograms for IgE detection at concentrations of 100, 250, 500, 750 fM and 1 pM using an aptamer-nanoparticle conjugate modified gold electrode with APL-anti-IgE and APP (Scheme A in Figure 1). The APP concentration was fixed at 20 μM along with a scan rate of 20 mV/s in each case. (b) Plot of anodic current following the reaction of APP with surface-bound ALP-anti-IgE conjugates. The dotted line represents a linear fit of the data.

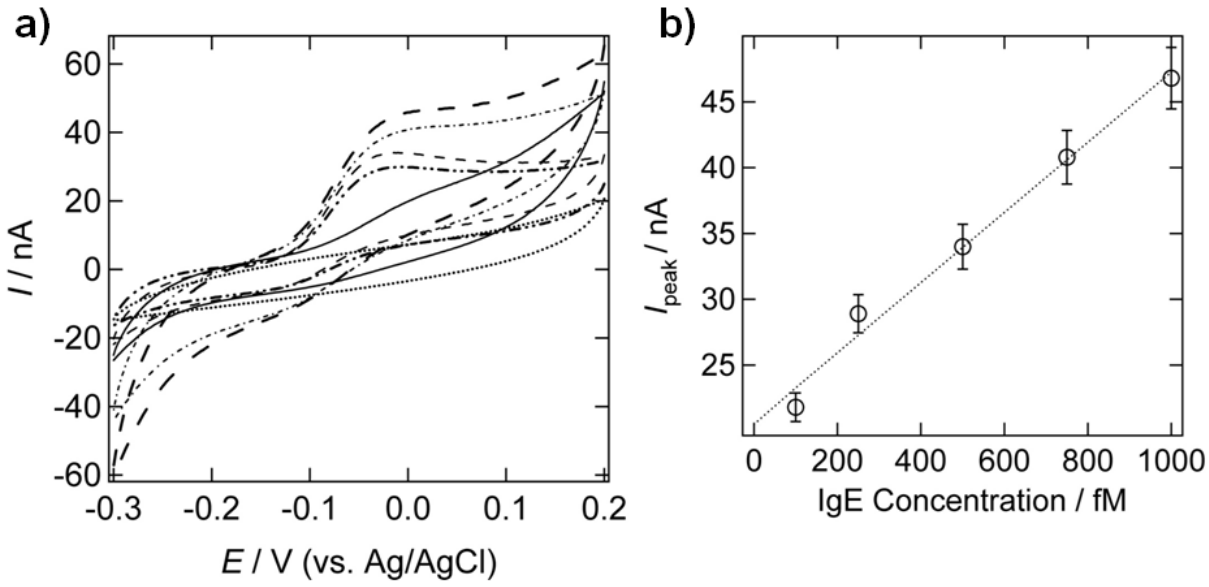

Figure S3. (a) Representative cyclic voltammograms for IgE detection at concentrations of 1, 10, 50 and 100 pM using an aptamer modified gold electrode in conjunction with APL-anti-IgE and APP (Scheme B in Figure 1). The APP concentration was fixed at 20 μM along with a scan rate of 20 mV/s in each case. (b) Plot of oxidative current following the reaction of APP with surface-immobilized ALP-anti-IgE conjugates. The dotted line represents a linear fit of the data.

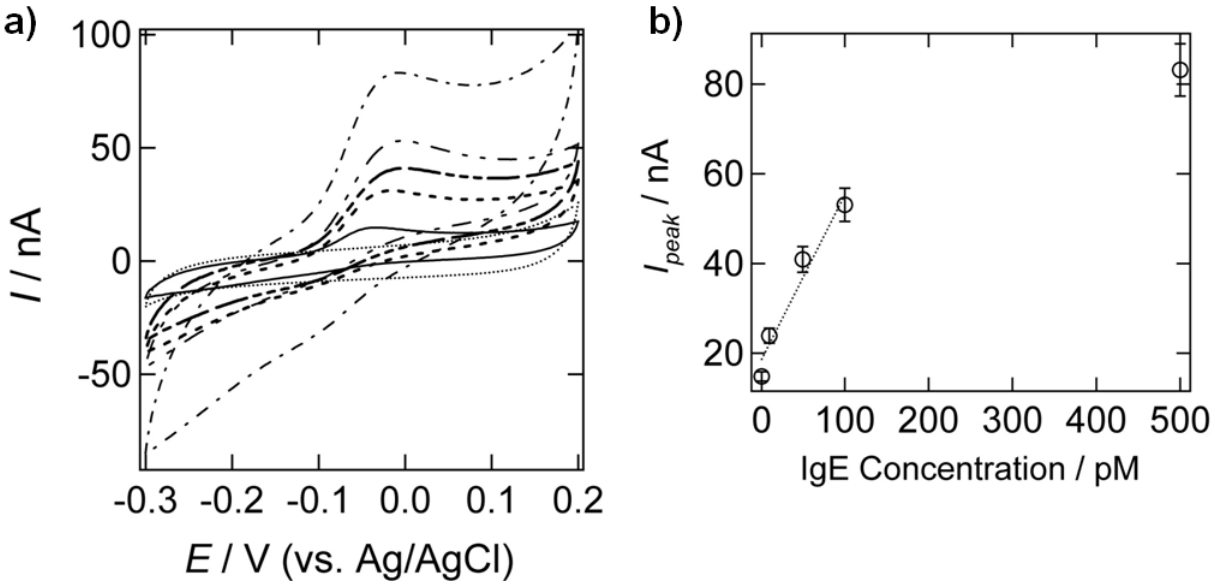

Figure S4. Representative cyclic voltammograms comparing IgE detection and control experiments for both Schemes A and B at target concentrations of (a) 100 pM and (b) 1 pM. BSA was used as a negative control at the same concentration as IgE to determine the level of non-specific adsorption of anti-IgE-ALP (curves A-NC and B-NC in both figures). To aid visualization, the IgE detection curves are presented as solid lines (Scheme A, black; Scheme B, blue) and the BSA control measurements are dotted lines. The APP concentration was fixed at 20 μM along with a scan rate of 20 mV/s in each case.

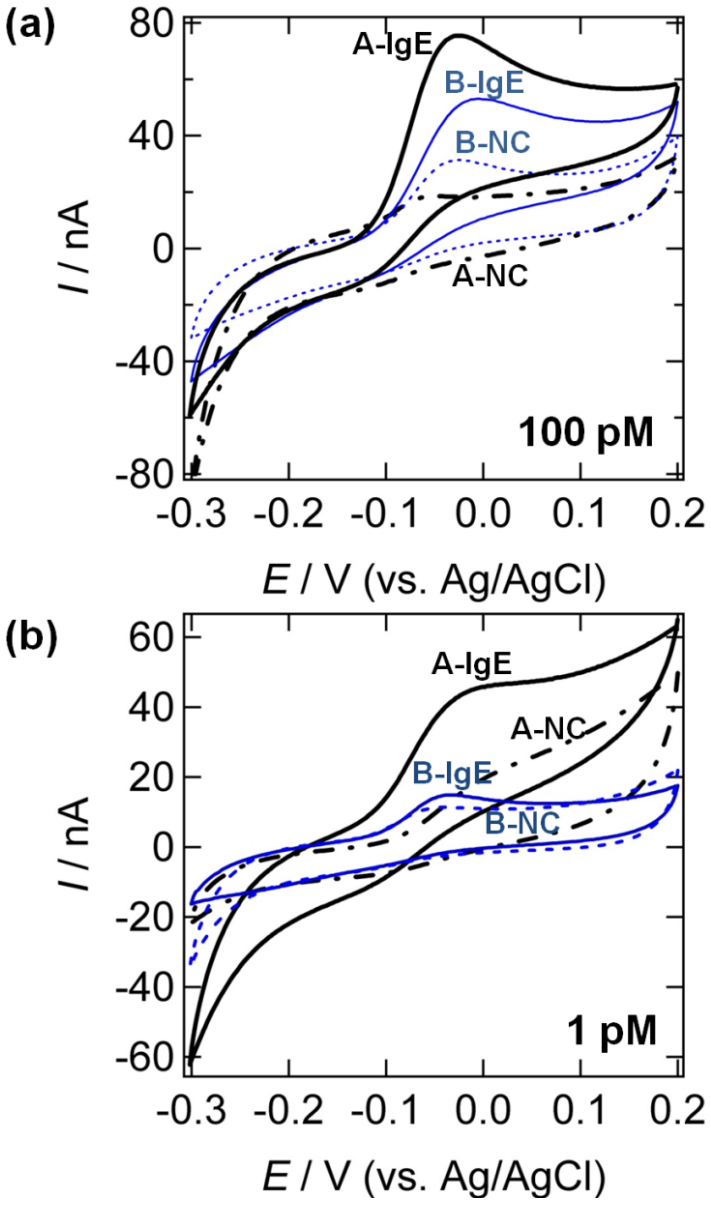

Figure S5. Representative AFM images showing the surface morphology of A) an aptamer coated Au electrode and B) a nanoparticle-aptamer modified Au electrode. The scanned electrode area is 3 μm x 3 μm and the data scale is 50 nm.

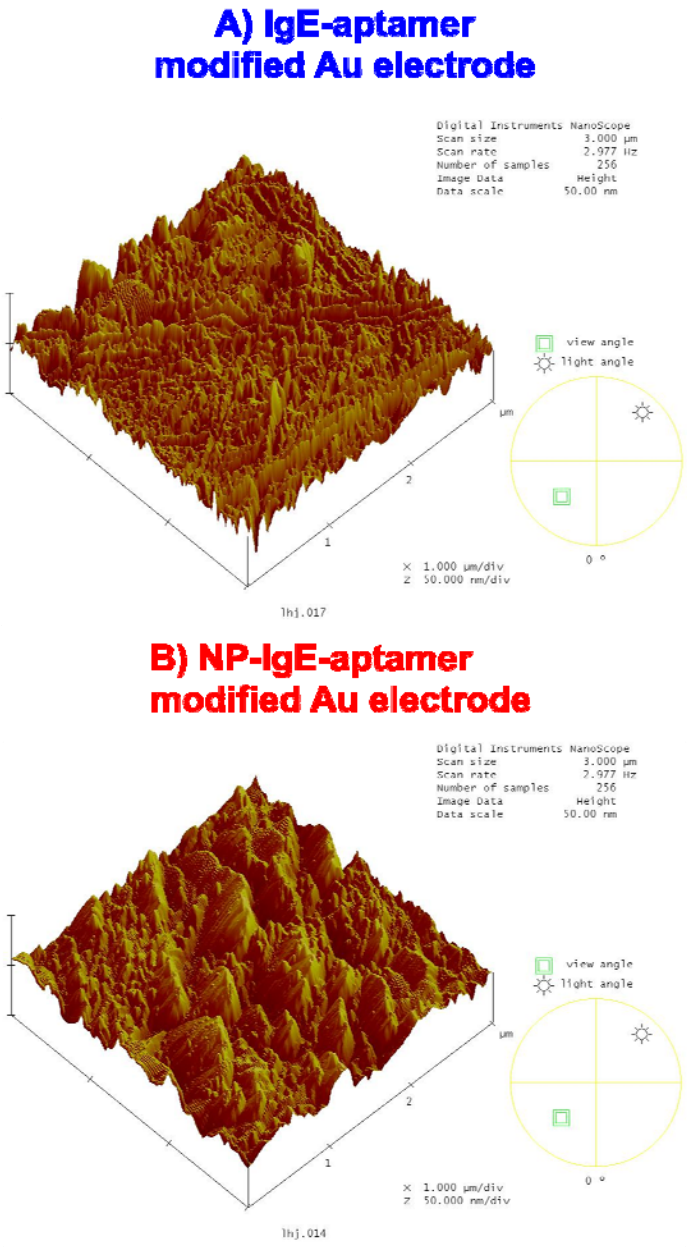

Figure S6. Representative AFM images showing the surface morphology of A) IgE-aptamer coated Au electrodes and B) nanoparticle-IgE-aptamer modified Au electrodes. The scanned electrode area is 10 μm x 10 μm and the data scale is 100 nm.