

Supporting Information

Electrochemically Controlled ATRP for Cleavage-Based Electrochemical Detection of Prostate-Specific Antigen at the Concentration of Femtomolar Level

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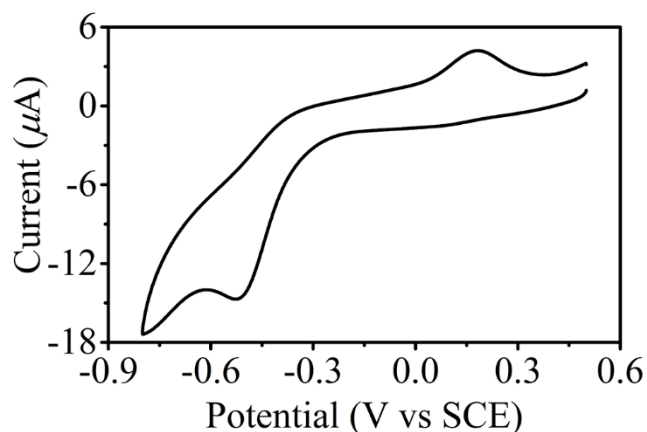


Figure S-1: Cyclic voltammogram of the AuE/MCH/P-COOH/Zr(IV)/BPAA in the FcMMA-free polymerization solution. PSA, 10 nM; scan rate, 0.1 V s^{-1} .

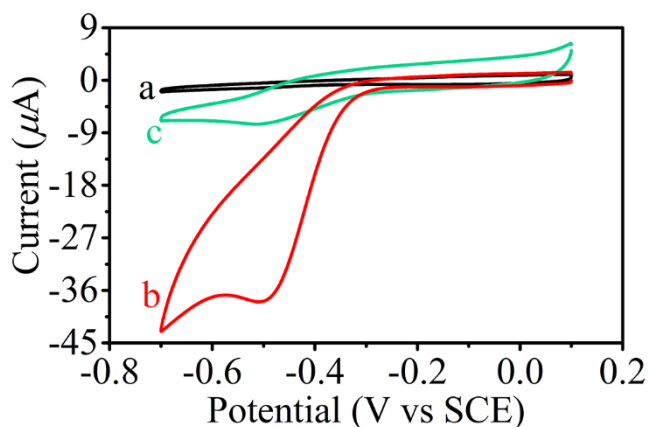


Figure S-2: Cyclic voltammogram of the AuE/MCH/P-COOH/Zr(IV)/BPAA in the (a) N_2 - or (b) O_2 -saturated, FcMMA- and $\text{Cu}^{\text{II}}\text{Br}/\text{Me}_6\text{TREN}$ -free polymerization solution, or in the (c) N_2 -saturated, FcMMA-free polymerization solution. PSA, 10 nM; scan rate, 0.1 V s^{-1} ; $\text{Cu}^{\text{II}}\text{Br}/\text{Me}_6\text{TREN}$, 0.5 mM. From curves b and c, it is clear to see that the reduction wave of oxygen overlaps with that of the $\text{Cu}^{\text{II}}\text{Br}/\text{Me}_6\text{TREN}$ deactivator. That is, the dissolved oxygen is consumed during the electrogeneration of $\text{Cu}^{\text{I}}/\text{Me}_6\text{TREN}$ activators. That's why the eATRP of FcMMA in this work can be performed without deoxygenating.

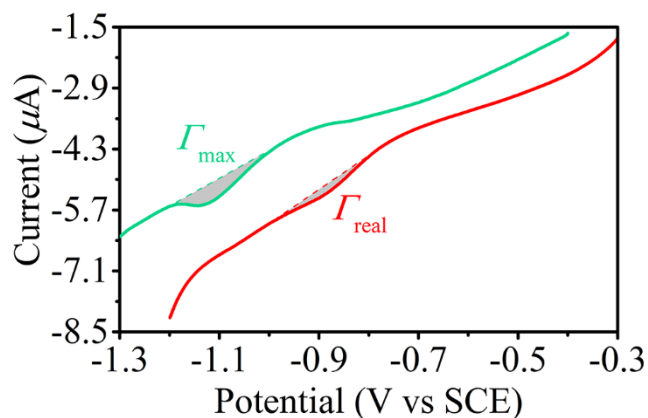


Figure S-3: LSV curves of reductive desorption of PSA peptides in 0.5 M KOH (N_2 saturated). Scan rate, 0.02 V s^{-1} ; quiet time, 30 s. The Γ values can be calculated according to $\Gamma = Q/FAv$, where Q , F , A , and v represent the integral value of the desorption wave ($\sim 0.0236 \mu\text{A V}$ for Γ_{real} and $\sim 0.0488 \mu\text{A V}$ for Γ_{max}), the Faraday constant, the electrochemical surface area (0.071 cm^2), and the scan rate (0.02 V s^{-1}).

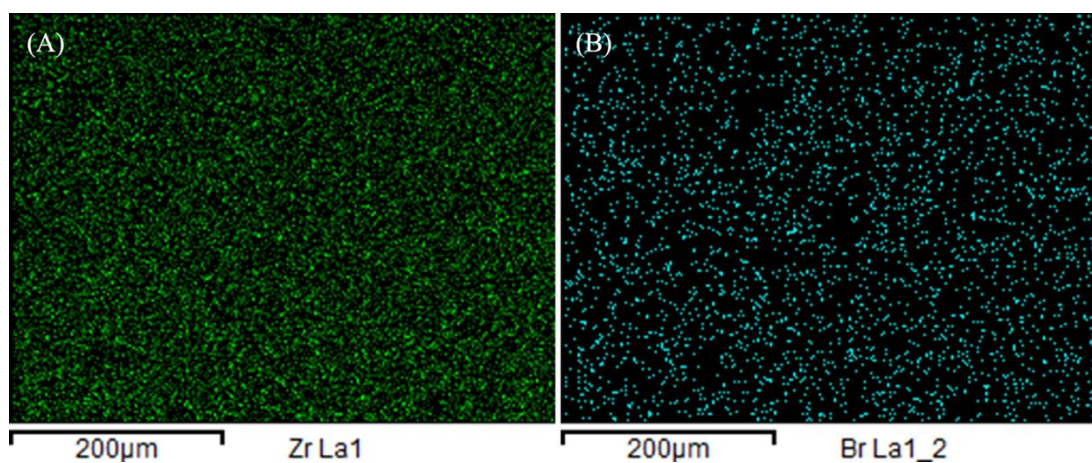


Figure S-4: Elemental mappings of (A) Zr and (B) Br. PSA, 10 nM.

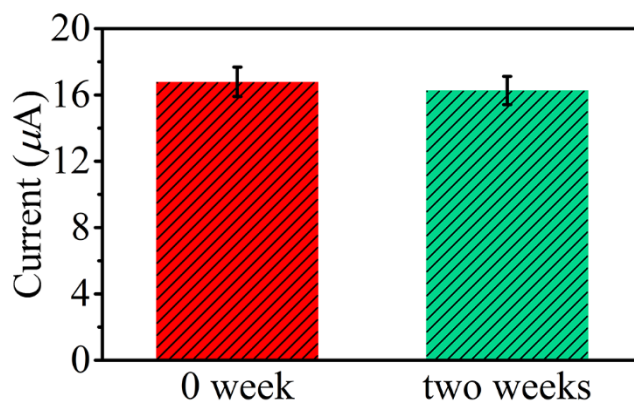


Figure S-5: Peak currents of the AuE/MCH/P-COOH/Zr(IV)/BPAA/Fc before and after a storage for two weeks. PSA, 10 nM. Error bars show the standard deviations ($n = 4$).



Figure S-6: Peak currents derived from the untreated NHS and the blank control. Error bars show the standard deviations ($n = 4$).