

Electrochemical investigations into Tau protein phosphorylations

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Supporting Information

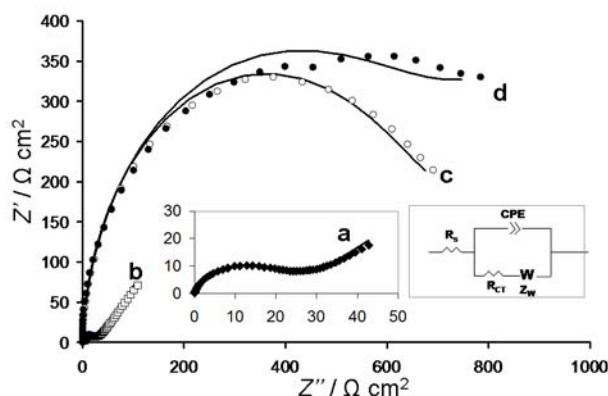


Fig. S1. Faradaic impedance spectra of a) bare gold electrode, b) Lip-NHS, c) Tau-modified gold electrode and d) ethanolamine blocking. The inset I shows bare gold electrode and the inset II depicts the equivalent circuit applied to fit all the data. The experimental data are represented by symbols, the fitting is a solid line, R_s , solution resistance, CPE constant phase element, R_{CT} charge transfer resistance, and Z_W is the finite length Warburg impedance. Measurements were done in 5 mM $K_4[Fe(CN)_6] \cdot 3H_2O$ and $K_3[Fe(CN)_6] \cdot 3H_2O$ in 0.1 M sodium phosphate buffer (pH 7.4).

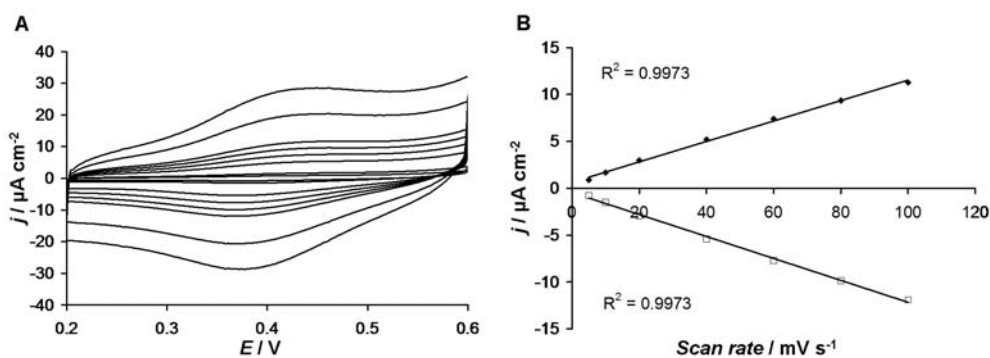


Fig. S2. A) Cyclic voltammograms as a function of scan rate for Fc-phosphorylated Tau-modified gold electrode. B) Plot of anodic and cathodic current densities as a function of scan rate (GSK-3 β catalyzed Fc-phosphorylation, Ag/AgCl as reference electrode, Pt wire as auxiliary electrode, 0.1 M sodium phosphate buffer pH 7.4).

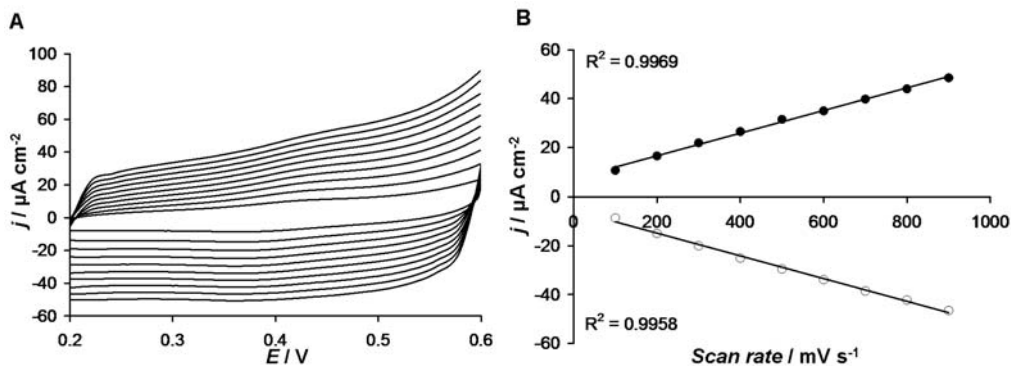


Fig. S3. A) Cyclic voltammograms as a function of scan rate for Fc-phosphorylated Tau-modified gold electrode. B) Plot of anodic and cathodic current densities as a function of scan rate (Src catalyzed Fc-phosphorylation, Ag/AgCl as reference electrode, Pt wire as auxiliary electrode, 0.1 M sodium phosphate buffer pH 7.4).

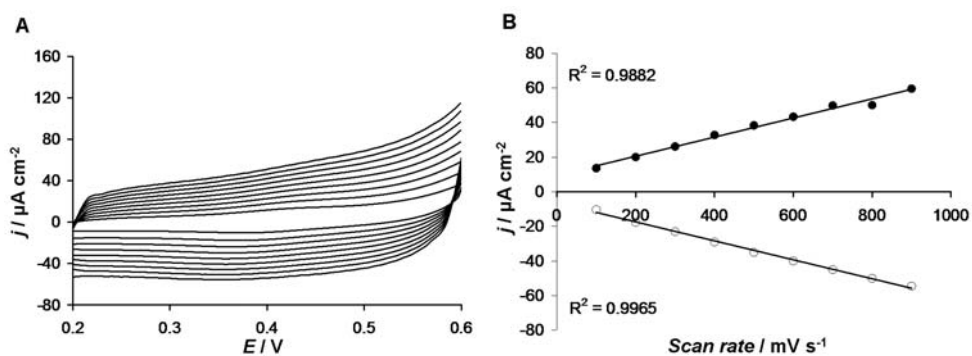


Fig. S4. (a) Cyclic voltammograms as a function of scan rate for Fc-phosphorylated Tau-modified gold electrode. (b) Plot of anodic and cathodic current densities as a function of scan rate (PKA catalyzed Fc-phosphorylation, Ag/AgCl as reference electrode, Pt wire as auxiliary electrode, 0.1 M sodium phosphate buffer pH 7.4).

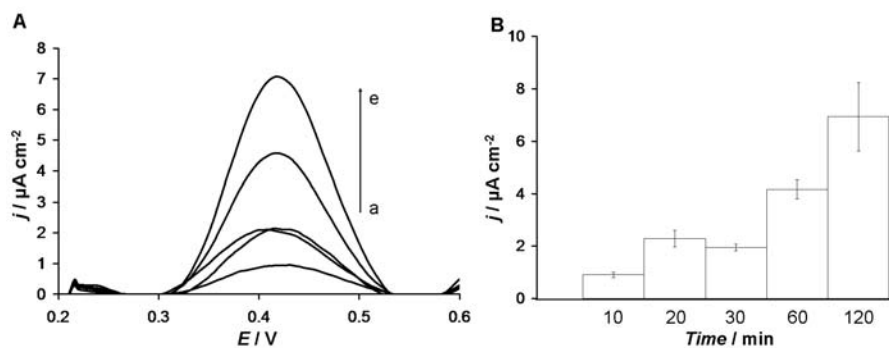


Fig. S5. A) Background-subtracted square-wave voltammograms and B) plot of the steady-state current density as a function of reaction time (a to e: 10, 20, 30, 60 and 120 min) for Tau-modified gold electrode in the presence of protein kinase ($0.5 \mu\text{g mL}^{-1}$) and Fc-ATP ($200 \mu\text{M}$). Ag/AgCl as reference electrode, Pt wire as auxiliary electrode, 0.1 M sodium phosphate buffer pH 7.4.

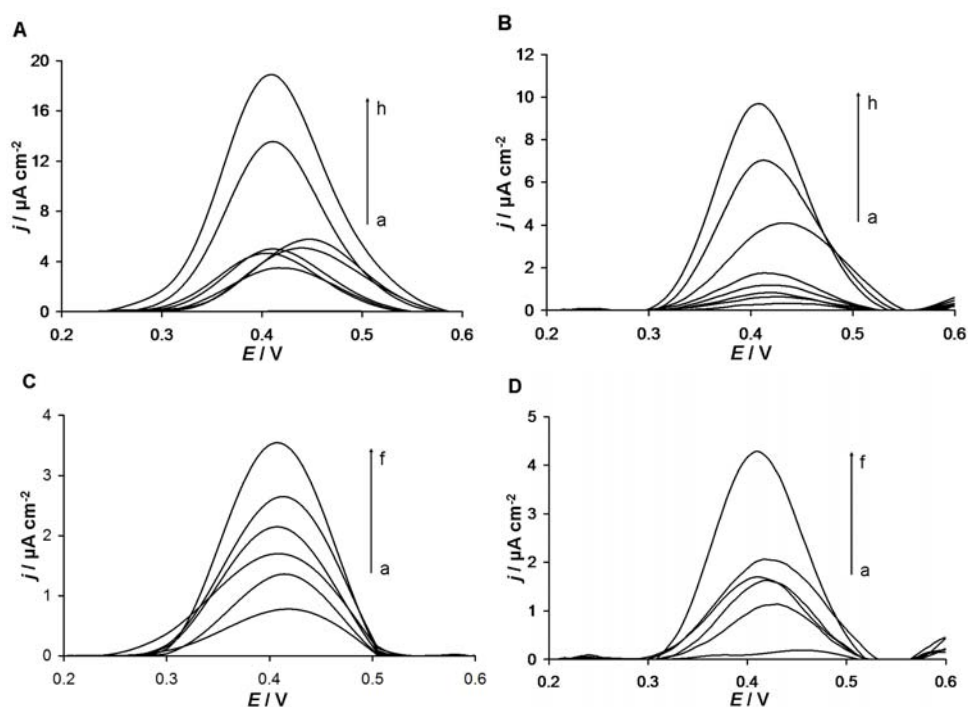


Fig. S6. Square-wave voltammograms of Tau-modified gold electrodes after Fc-phosphorylation reactions in the presence of A) Fc-ATP ($200 \mu\text{M}$) and variable PKA concentrations; PKA concentrations from a to h are 0, 0.01, 0.08, 0.3, 0.8 and $1 \mu\text{g mL}^{-1}$. B) PKA ($0.5 \mu\text{g mL}^{-1}$) and variable Fc-ATP concentrations; Fc-ATP concentrations from a to h are 0, 3, 5, 50, 75, 166, 250 and $416 \mu\text{M}$. C) Fc-ATP ($200 \mu\text{M}$) and variable Src concentrations; Src concentrations from a to f are 0.01, 0.05, 0.1, 0.2, 0.5 and $1 \mu\text{g mL}^{-1}$. D) Src ($0.5 \mu\text{g mL}^{-1}$) and variable Fc-ATP concentrations. Fc-ATP concentrations from a to f are 0, 5, 25, 43, 83 and $250 \mu\text{M}$.

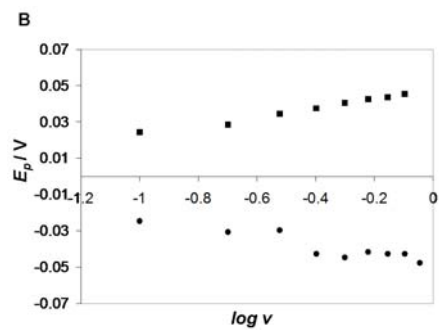


Fig. S7. Representative Laviron plot ($\log v$ versus E_p) of the immobilized Tau film on Au surface following the Fc-phosphorylation with Fc-ATP and Src.