

**Supporting information**

**An innovative transportable immune-device for the recognition of  $\alpha$ -Synuclein using KCC-1-*nPr*-CS<sub>2</sub> modified silver nano-ink: Integration of pen-on-paper technology with biosensing toward early-stage diagnosis of Parkinson**

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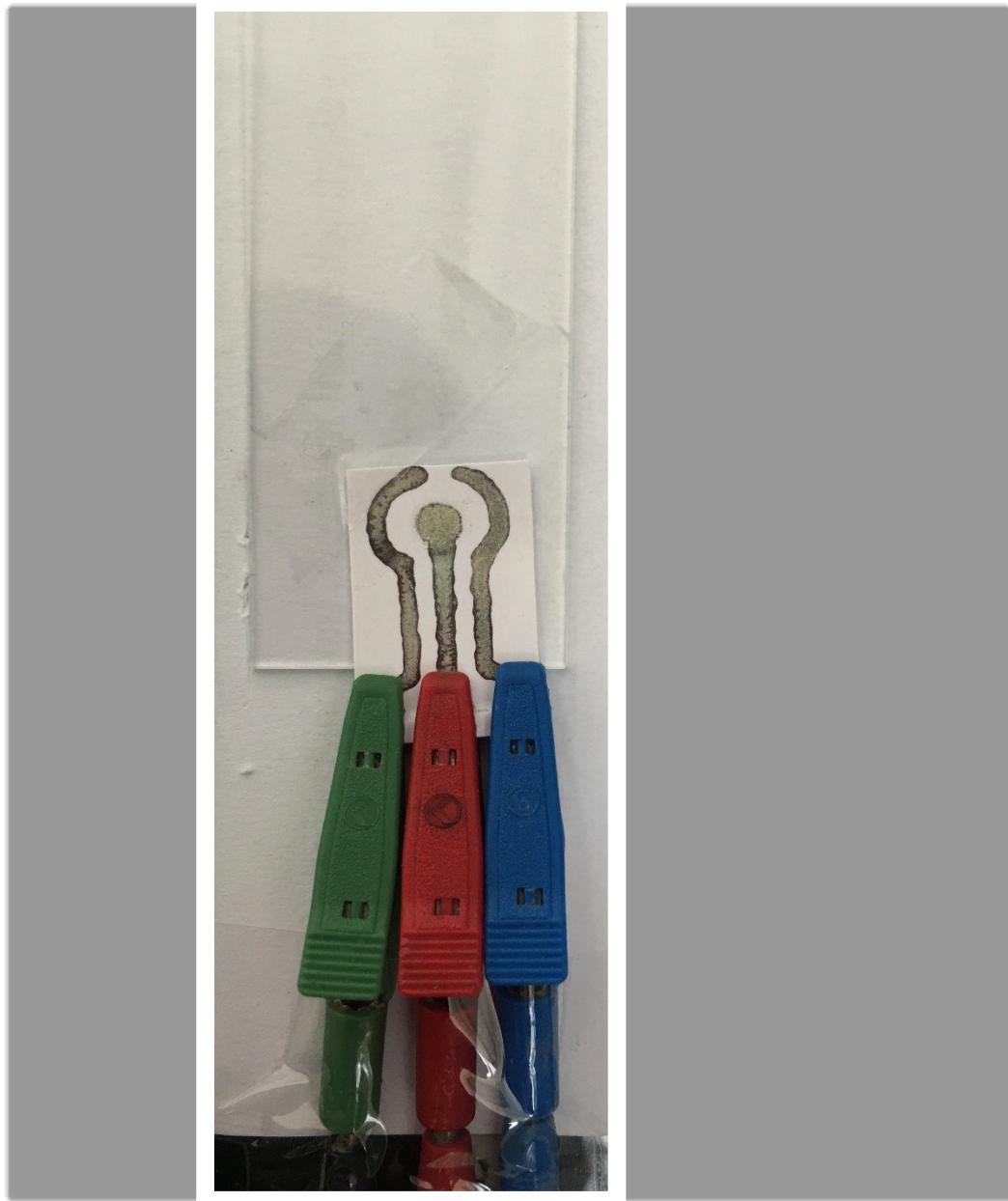
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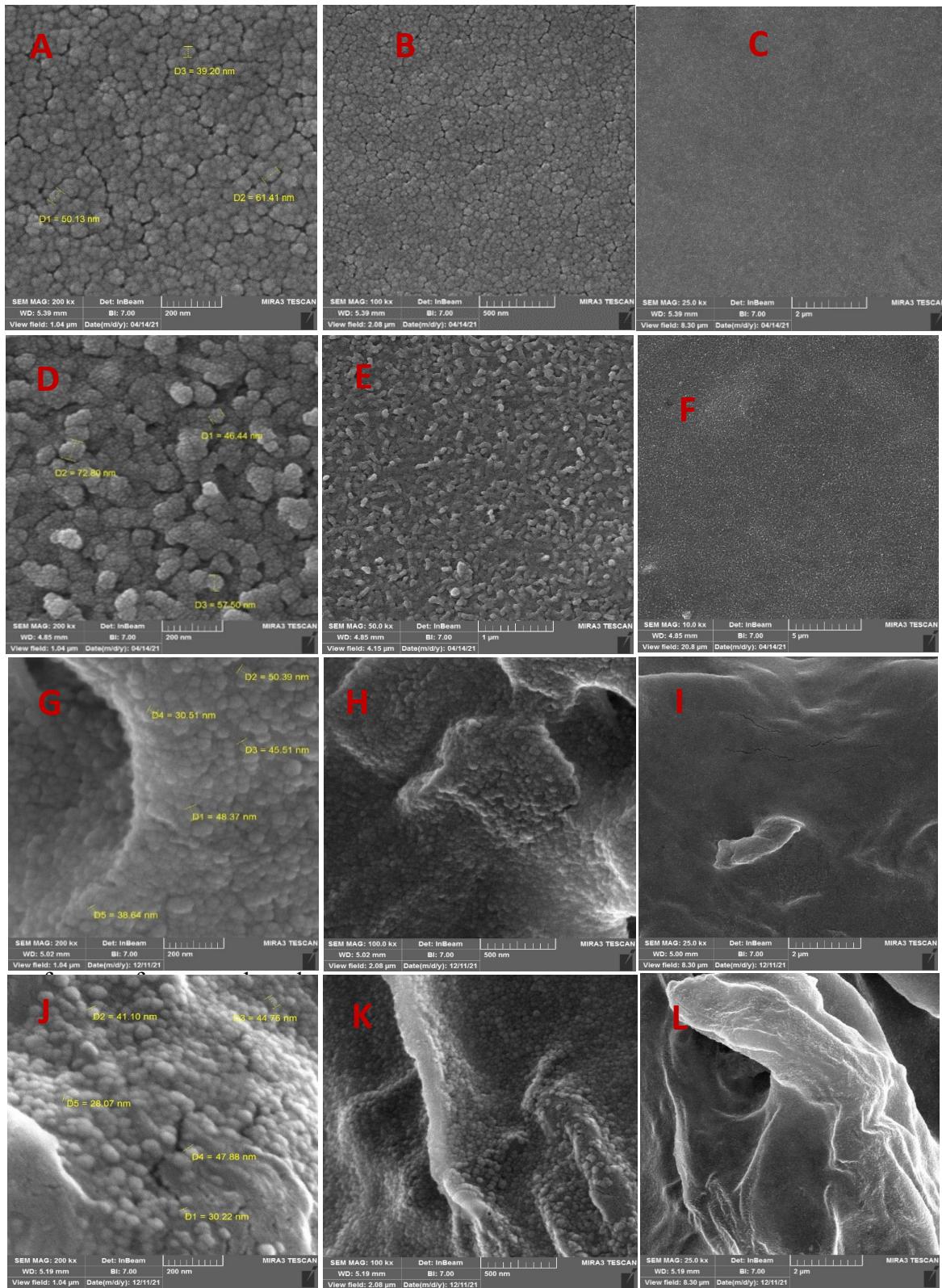
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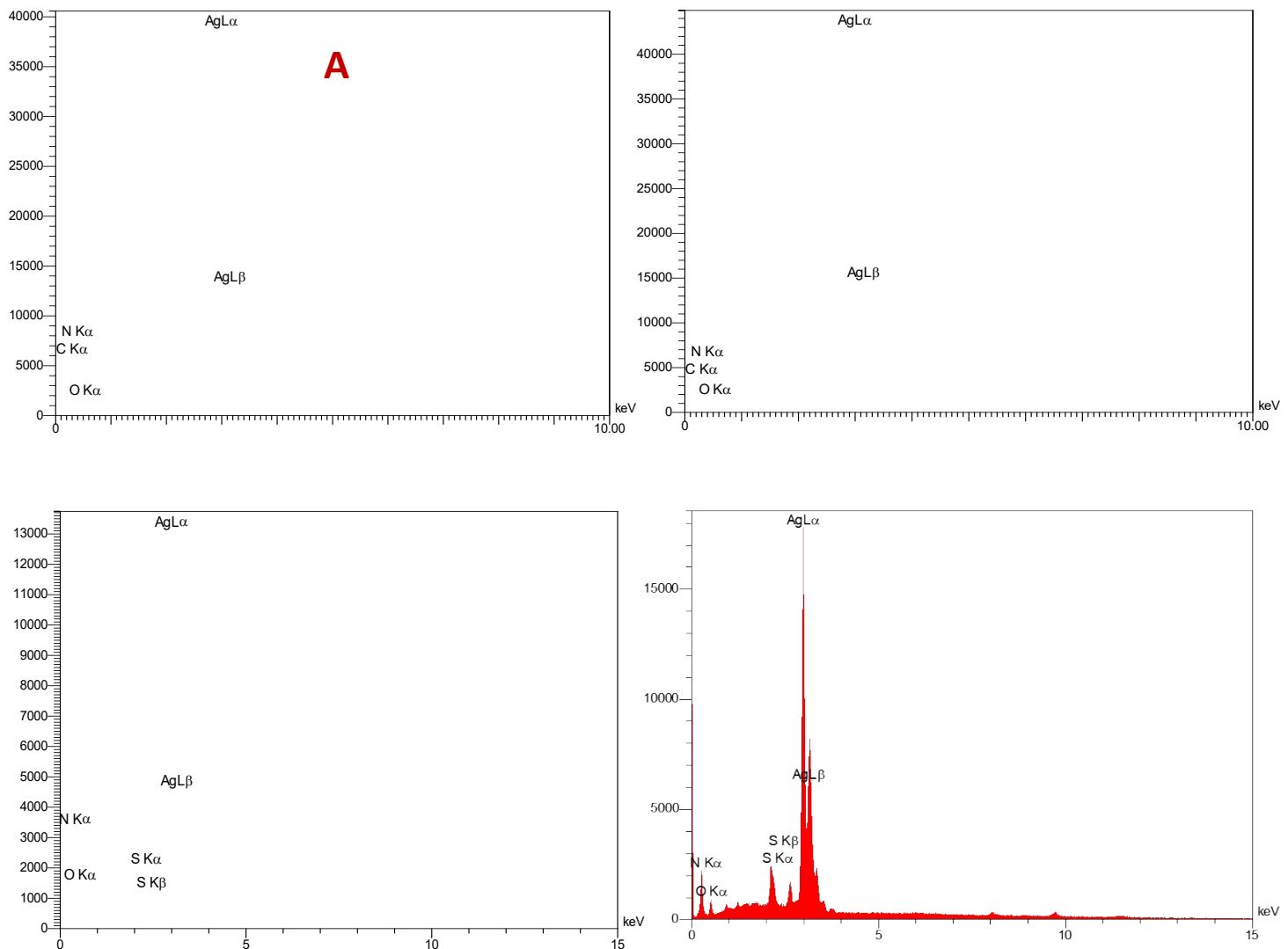
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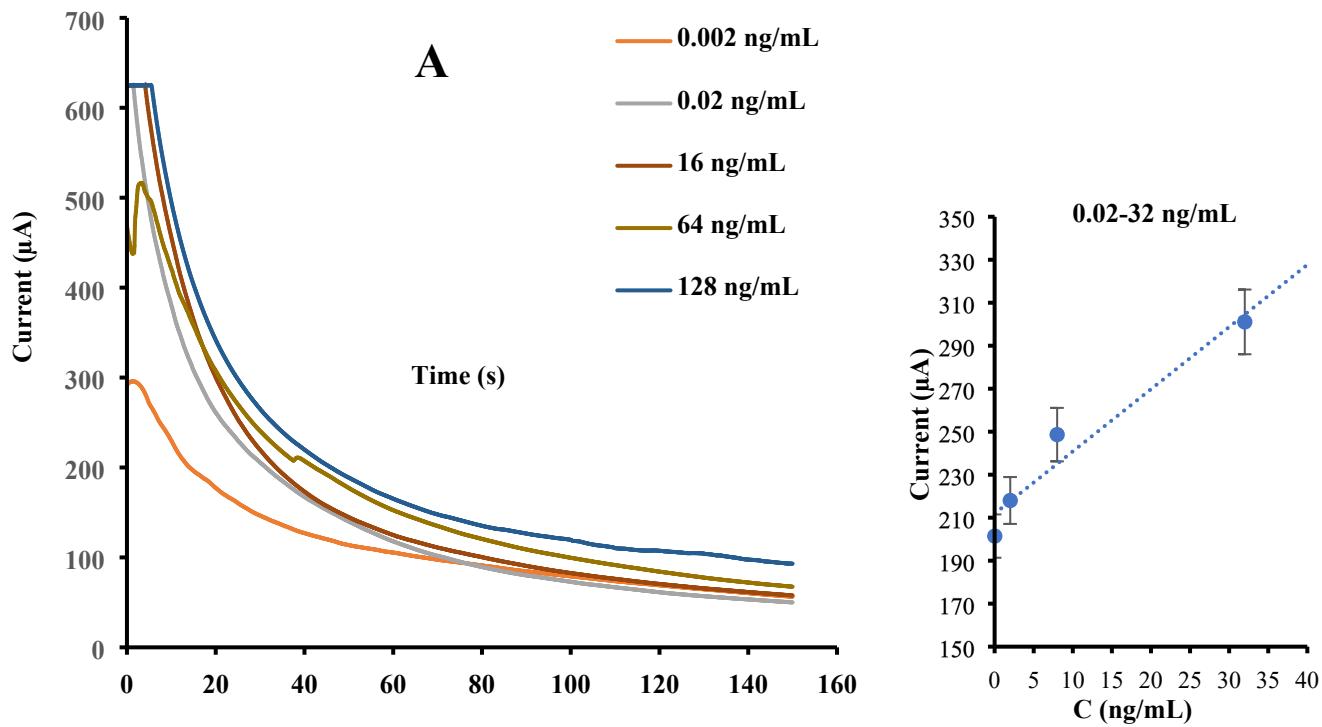


**Scheme S1.** Indicates the connection of the designed three-electrode system by conductive Ag-ink (reference, working and counter electrode) to the electrochemical device.

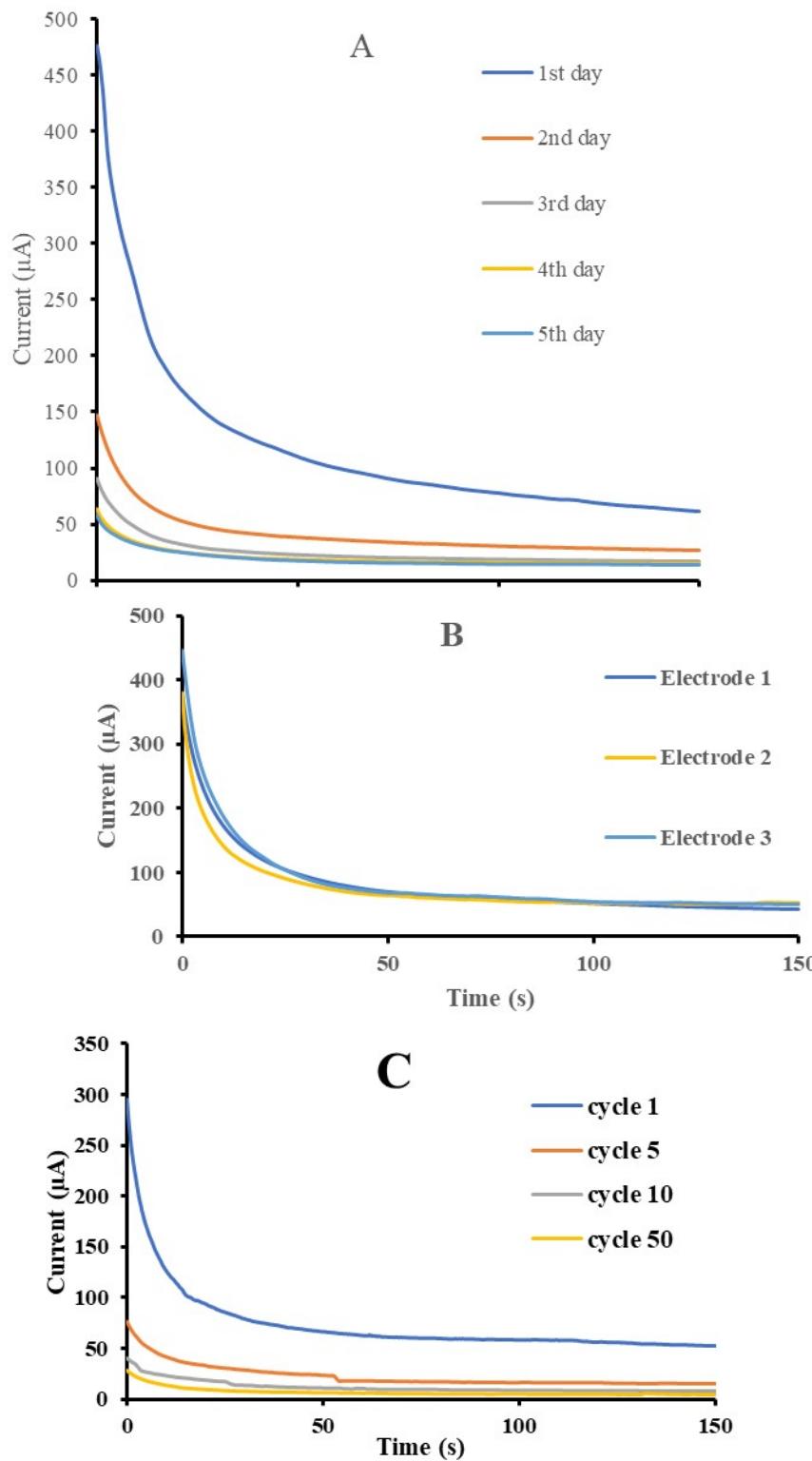


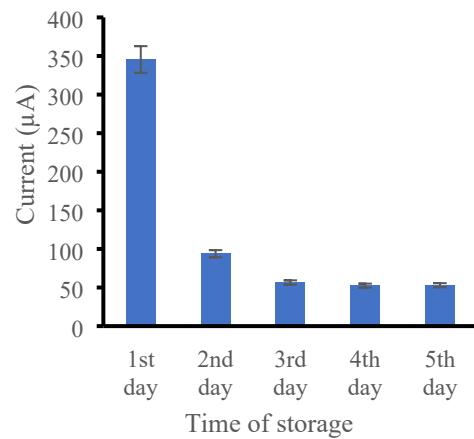


**Figure S2.** EDS results of **A**: bulk Ag ink (41), **B**: Ag ink/(KCC-1-NH-CS<sub>2</sub>)-Ab, and **C**: Ag ink/(KCC-1-NH-CS<sub>2</sub>)-Ab/BSA/Ag.

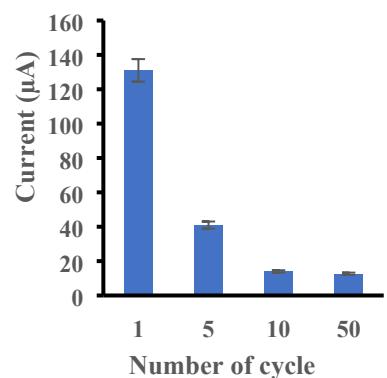


**Figure S3. A)** ChAs of immunosensor in the presence of various concentrations of  $\alpha$ -syn antigen (0.002, 0.02, 16, 64, and 128 ng/ml) spiked with human plasma samples in 0.01M  $[\text{Fe}(\text{CN})_6]^{3/4-}$ /KCl solution as electrochemical probe in  $E=0.6$  V, duration time=150, **B)** Calibration curve of current intensity changes against  $\alpha$ -synuclein antigen concentrations spiked with human plasma samples.





**a**



**c**

**Figure S4.** ChAs related to stability analysis of prepared sensor in the presence of 0.01M  $[\text{Fe}(\text{CN})_6]^{3/4}/\text{KCl}$  solution as electrochemical probe in  $E=0.25$  V, duration time=150: **A)** Inter-day stability and its histogram, **B)** Repeatability, and **C)** Cyclic stability and its histogram (c).

**Table S1.** The repeatability of  $\alpha$ -Syn immunosensor.

Concentration(ng/ml)	I <sub>1</sub> /μA	I <sub>2</sub> /μA	I <sub>2</sub> /μA	SD	AVE <sub>STDV</sub>
2	278	276	270	3.59	2.26
8	299	295	297	2.66	
32	372	369	368	2.82	
128	610	612	608	1.41	