Electronic Supplementary Material (ESI) for Analytical Methods

Supporting Information

Polypyrrole nanotubes-polyaniline composite for DNA detection using methylene blue as intercalator

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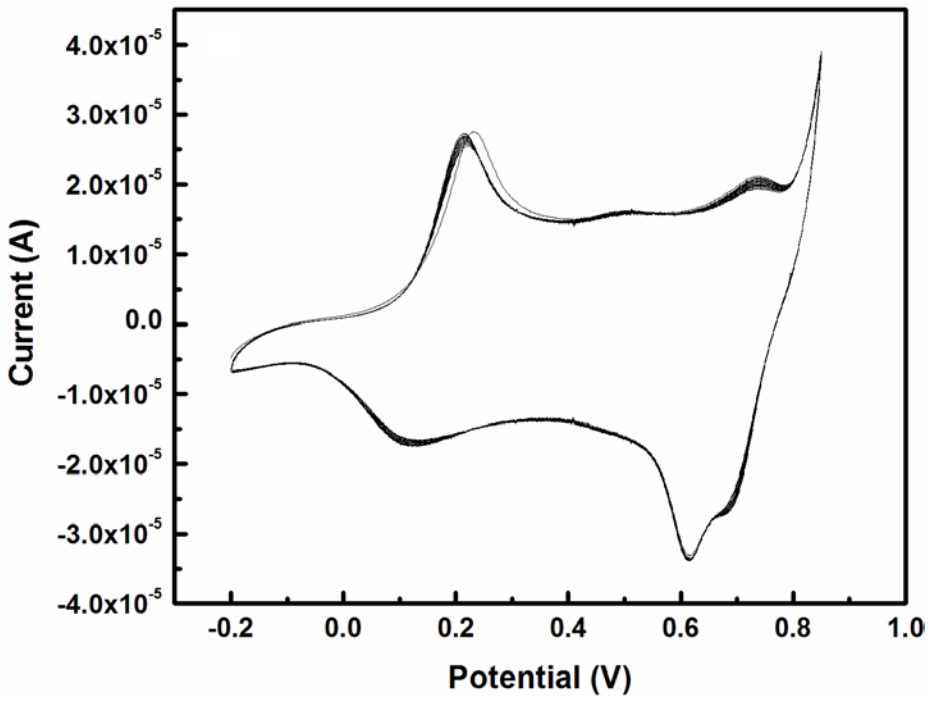

Fig.S1 CV response of PPy-PANi modified Au electrode measured in 1M HCl in the potential window -0.2 to 0.8 V at a scan rate of 50 mV/s

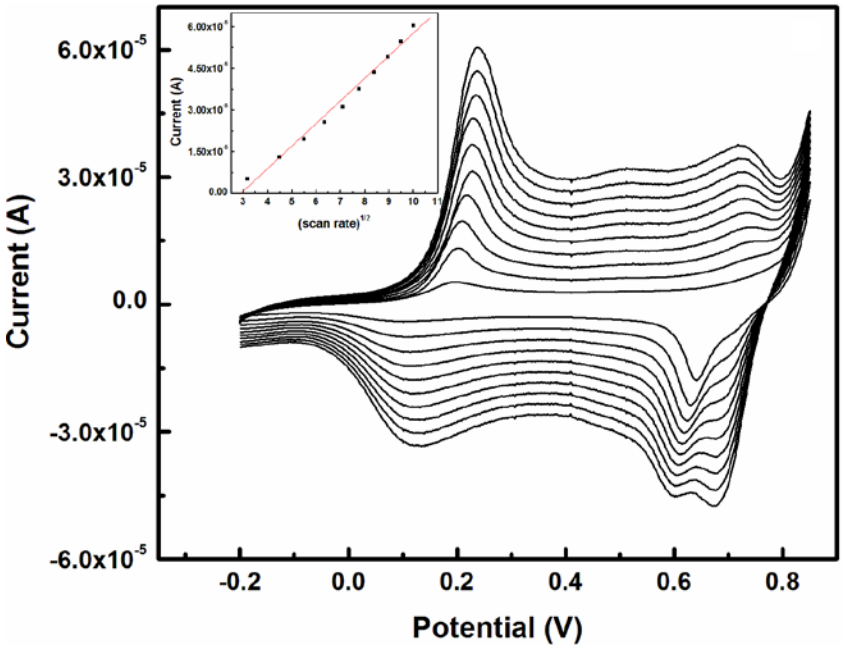

Fig.S2 CV response of PPy-PANi modified Au electrode measured in 1M HCl in the potential window -0.2 to 0.8 V. Effect of scan rate (10- 100 mV/s) on PPy-PANi redox behavior in 1M HCl; (Inset shows the scan rate vs current graph).

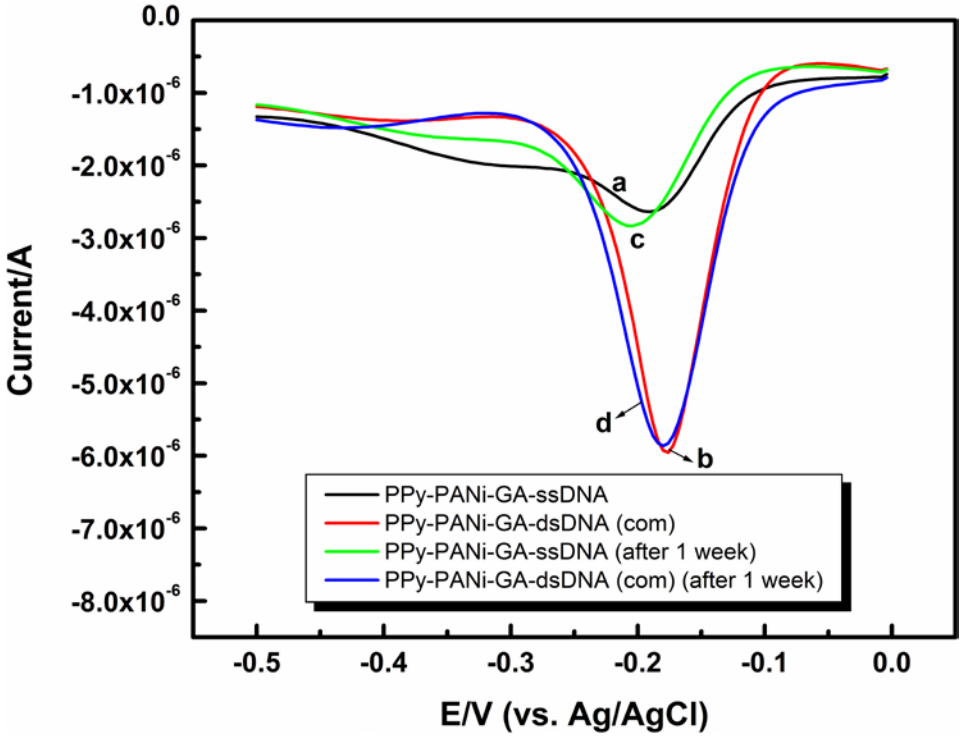

Fig.S3 DPV response of PPy-PANi-GA-ssDNA modified electrode (a and c) and hybridized with complementary target DNA (b and d) measured in PB (pH 7.0) solution in the potential window -0.5 to 0.0 V.

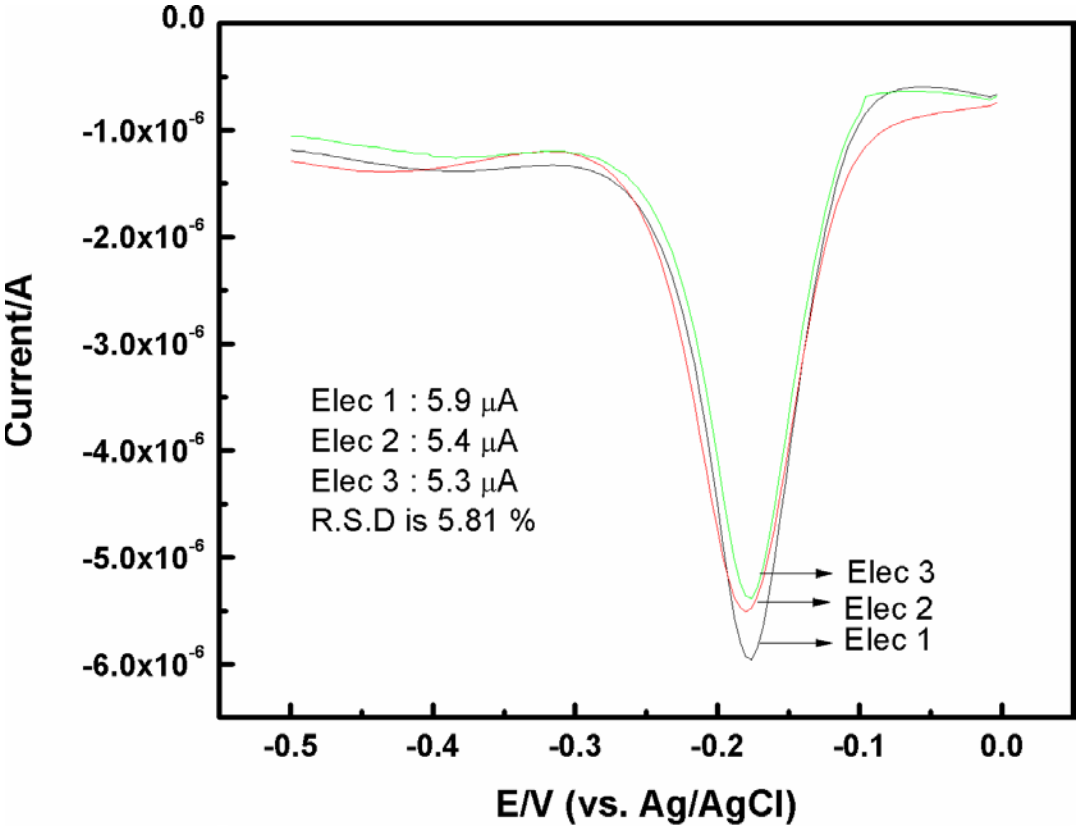

Fig. S4 DPV response of PPy-PANi-GA-ssDNA modified three independent electrodes hybridized with complementary target DNA, measured in PB (pH 7.0) solution in the potential window -0.5 to 0.0 V.

Supplementary Table S1 Impedance spectra (IS), cyclic voltammetry (CV) and differential pulse voltammetry (DPV) modification of Au electrode

Surfaces	***Electrochemical Parameters***			
	IS	**CV**		**DPV**
	R_{CT} (Ω cm^{-2})	ΔE_P (mV)	i_{pa} (μA)	i_{pc} (μA)
Bare Au	1078	80	8.86	1.67
PPy-PANi	2618	120	9.04	1.89
PPy-PANi-GA	6677	260	8.40	2.15
PPy-PANi-GA-ssDNA	12690	270	5.50	2.60
PPy-PANi-GA-dsDNA	15770	460	5.38	6.00

Supplementary Table S2 The performance comparison of currently fabricated DNA biosensor with reported literatures

Matrix for DNA immobilization	**Detection techniques**	**Linear range (M)**	**Detection limit (M)**	**Reference**
Au NP/PPAA/MWCNT	DPV	9.0×10^{-12} to 9.0×10^{-09}	3.2×10^{-12}	Yuzhong et al., 2009
Au NP/PANi	EIS	3.1×10^{-12} to 1.0×10^{-06}	3.1×10^{-13}	Yuanyuan et al., 2008
Au NP/PLL	CC	1.0×10^{-13} to 1.0×10^{-11}	3.5×10^{-14}	Jie et al., 2010
Au NP/HDT	DPV	1.0×10^{-12} to 10×10^{-09}	1.0×10^{-12}	Shufeng et al., 2010
CdS/PPy	EIS	3.7×10^{-09} to 3.7×10^{-07}	1.0×10^{-09}	Peng et al., 2006
PDDA/PDC-SWNT	DPV	1.0×10^{-11} to 1.0×10^{-06}	2.6×10^{-12}	Yang et al., 2008
Ag NP /MWCNTs	DPV	3.2×10^{-12} to 5.3×10^{-09}	6.4×10^{-13}	Shuyan et al., 2009
SiO_2 NP/PATP	EIS	1.0×10^{-11} to 1.0×10^{-06}	1.5×10^{-12}	Yao et al., 2008
Chitosan and Au NP	DPV	1.0×10^{-10} to 5.0×10^{-09}	5.0×10^{-11}	Hong et al., 2002
Au NP /MWCNT	DPV	5.0×10^{-10} to 1.0×10^{-11}	6.2×10^{-12}	Yuzhong et al., 2009
Au NP /PPy/MWCNT	DPV	5.0×10^{-12} to 1.0×10^{-09}	4.3×10^{-13}	Liu et al., 2011
Au NP/PANi-PPy	EIS	1.0×10^{-12} to 1.0×10^{-06}	1.0×10^{-13}	Wilson et al., 2012
PPy-PANi	DPV	1.0×10^{-13} to 1.0×10^{-09}	5.0×10^{-14}	This work

Abbreviations: NP - Nanoparticles; PPAA - Poly(trans-3-(3-pyridyl) acrylic acid); PANi - Polyaniline; PLL – Poly(L-lysine); HDT-Hexanedithiol; PPy-Polypyrrole; PDDA-poly(diallydimethyl ammonium chloride) ; PDC- Pyridinedicarboxylic acid; PATP-p-aminothiophenol.