Supplementary Information (SI)

Displacement reduction routed Au-Pt bimetallic nanoparticles: A highly durable electrocatalyst for methanol oxidation and oxygen reduction

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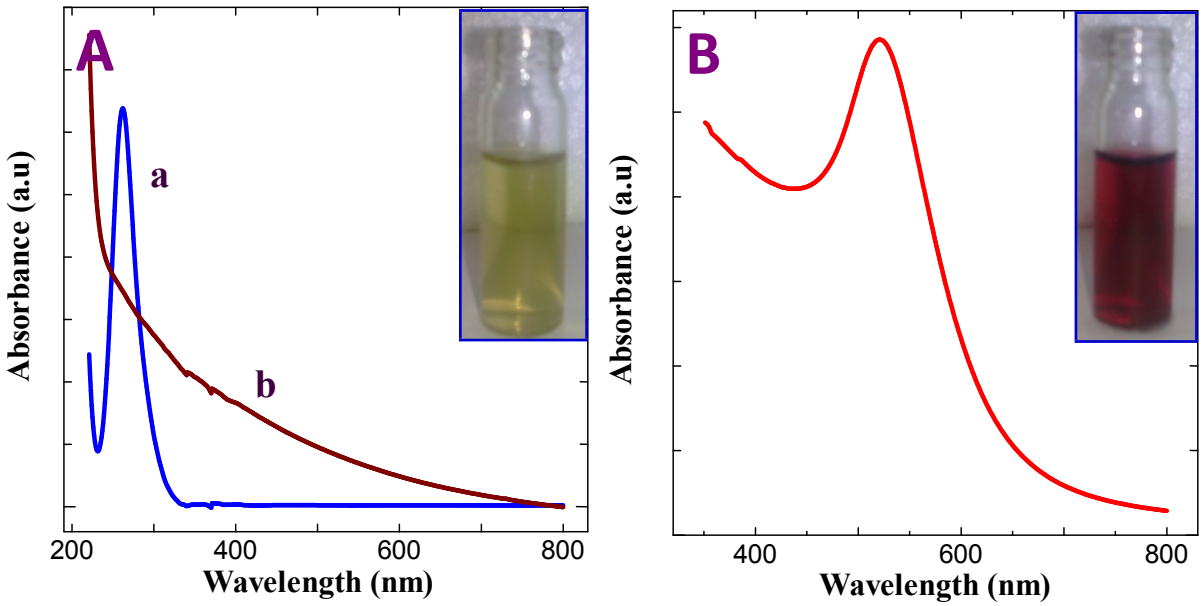

Fig. S1. UV-vis spectra obtained for (A) (a) H_2PtCl_6 and (b) cit-PtNPs and (B) cit-AuNPs. **Insets:** Photographs of (A) PtNPs and (B) AuNPs.

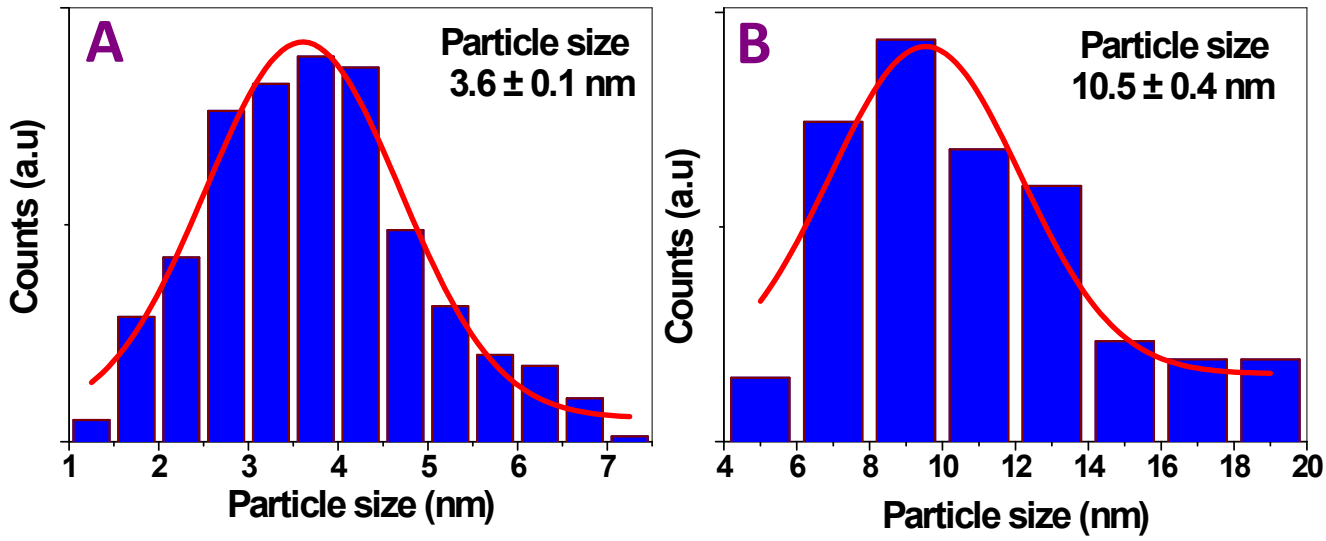

Fig. S2. Histograms obtained from the HR-TEM images of (A) PtNPs and (B) Au-PtNPs with Gaussian fit.

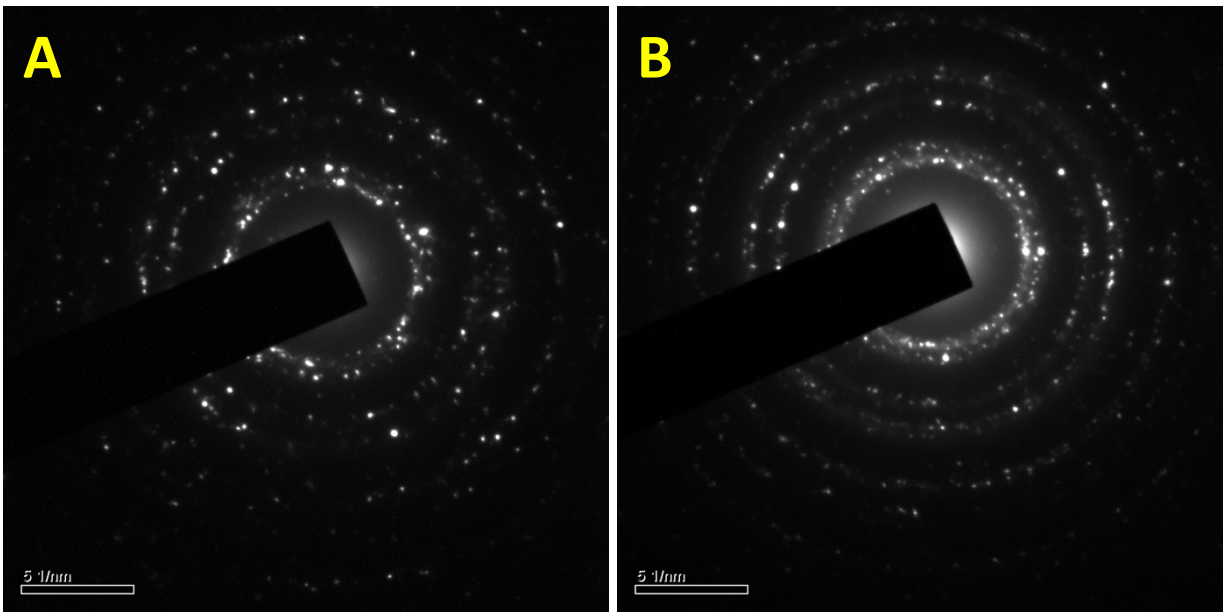

Fig. S3. SAED pattern obtained for (A) PtNPs and (B) Au-PtNPs.

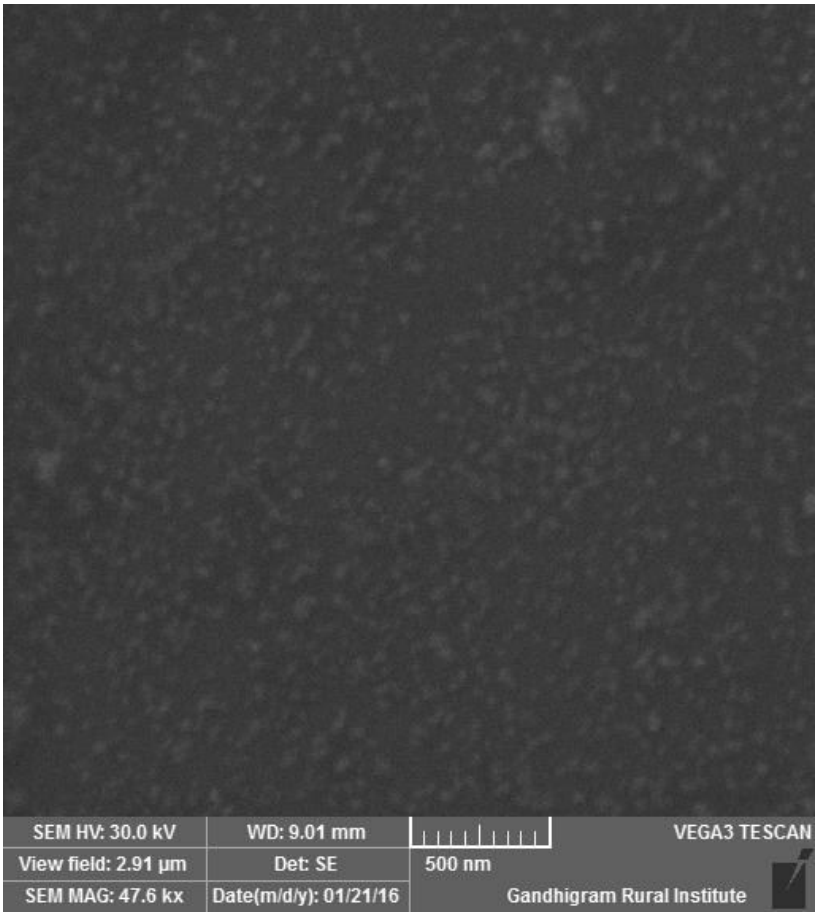

Fig. S4. SEM image obtained for Au-PtNPs modified substrate.

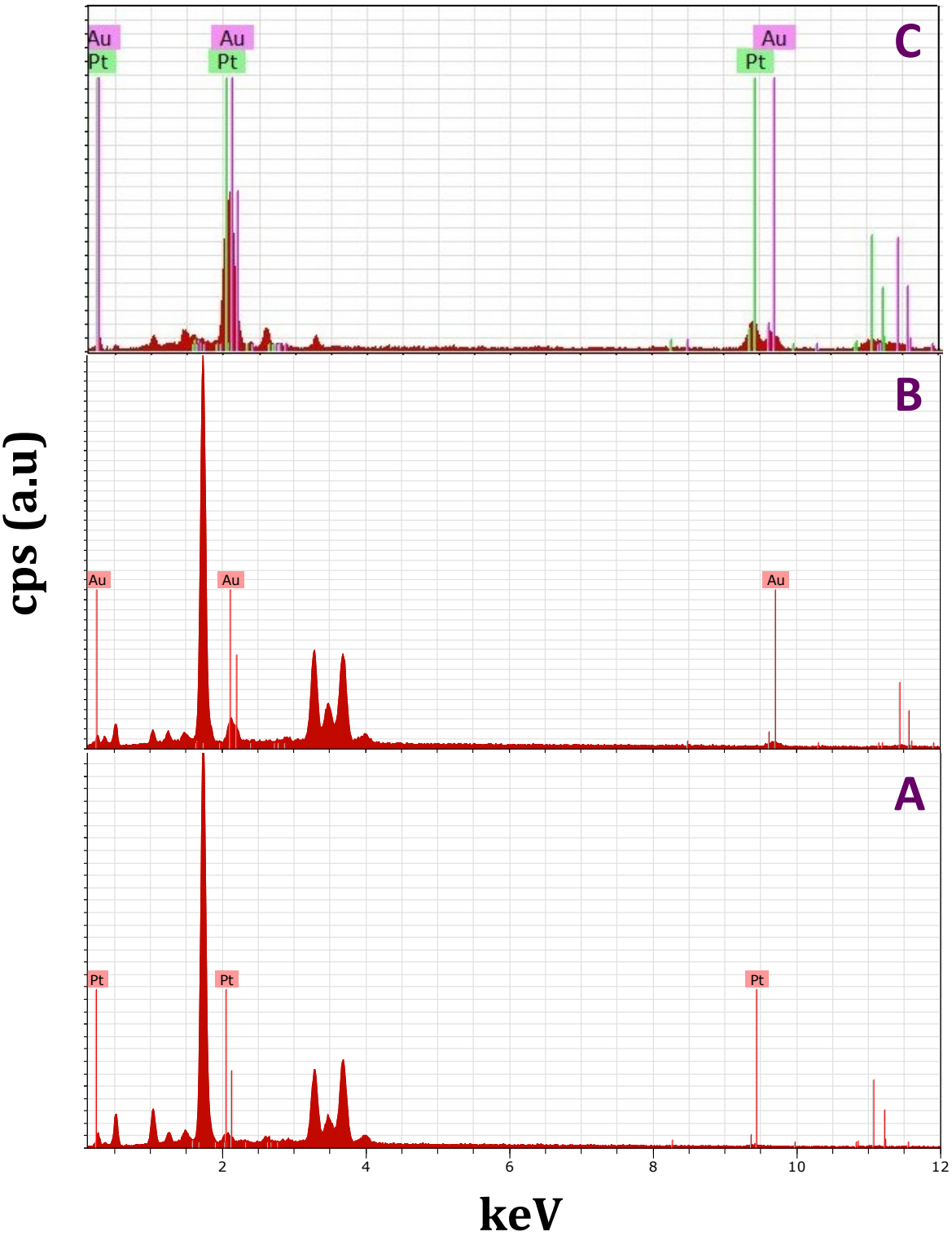

Fig. S5. EDAX spectra obtained for (A) PtNPs, (B) AuNPs and (C) Au-PtNPs modified substrates.

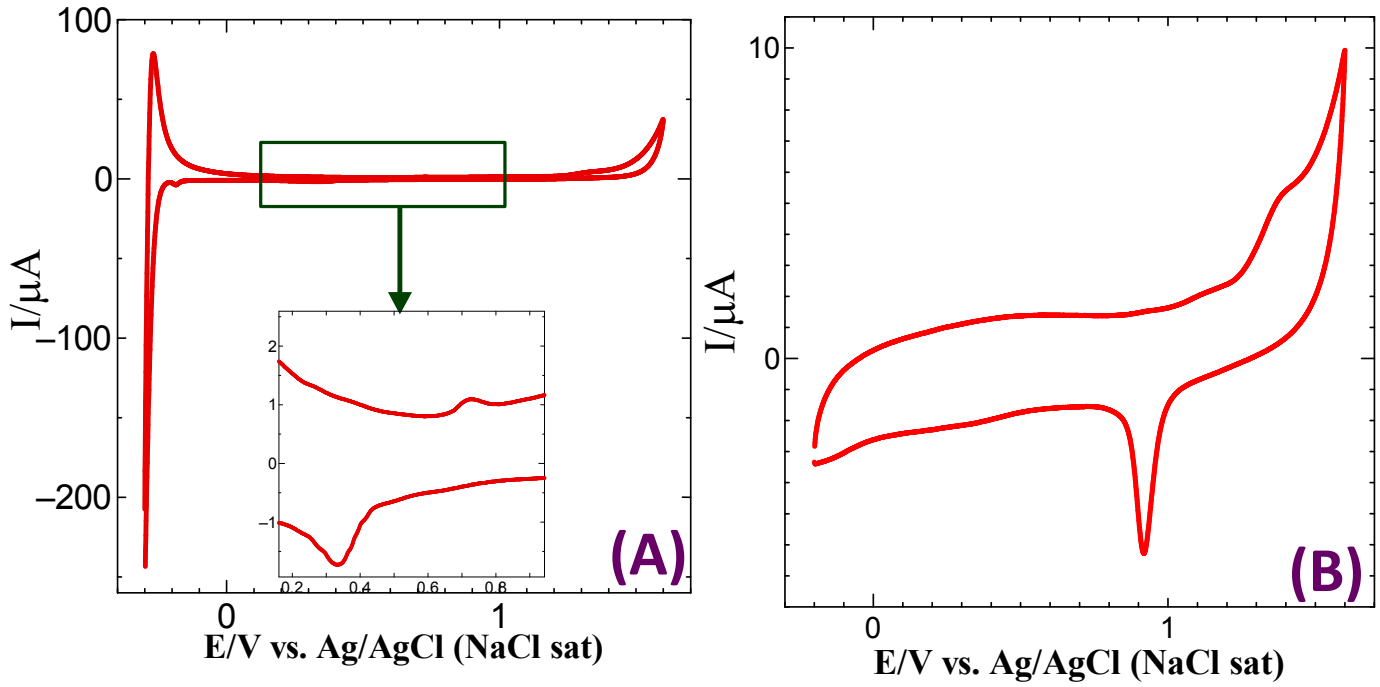

Fig. S6. CVs obtained for (A) GC/HDA/PtNPs and (B) GC/HDA/AuNPs electrodes in 0.5 M H_2SO_4 at a scan rate of 10 mV s^{-1}.

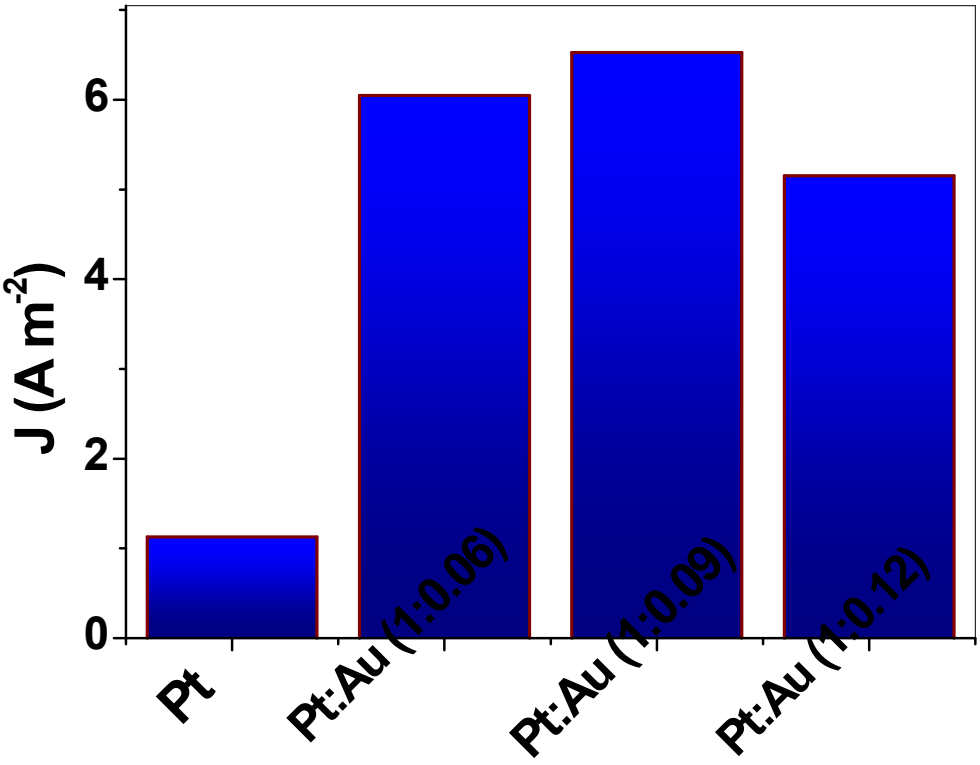

Fig. S7. Comparison of methanol oxidation current densities obtained at GC/HDA/Pt and GC/HDA/Au-PtNPs electrodes.

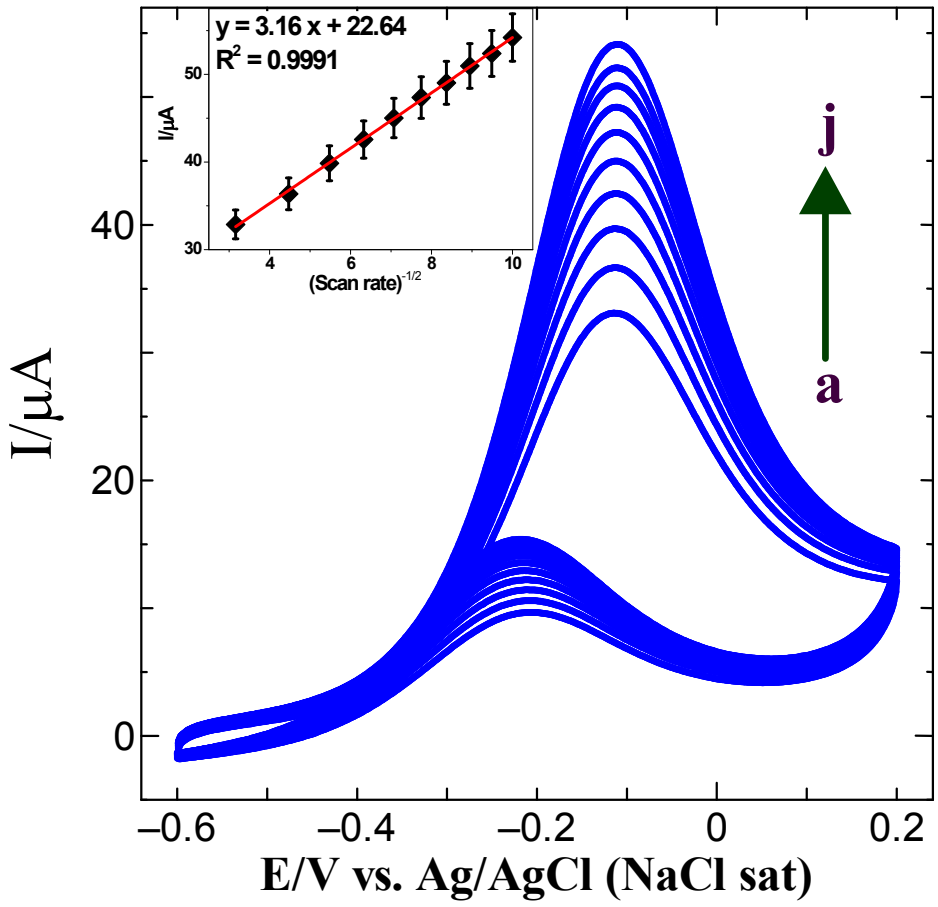

Fig. S8. CVs obtained for 1 M methanol at GC/HDA/Au-PtNPs electrode in 1 M KOH at scan rates of 10-100 mV s^{-1} (a-j). **Inset:** Plot of methanol oxidation current *vs.* square root of scan rates.

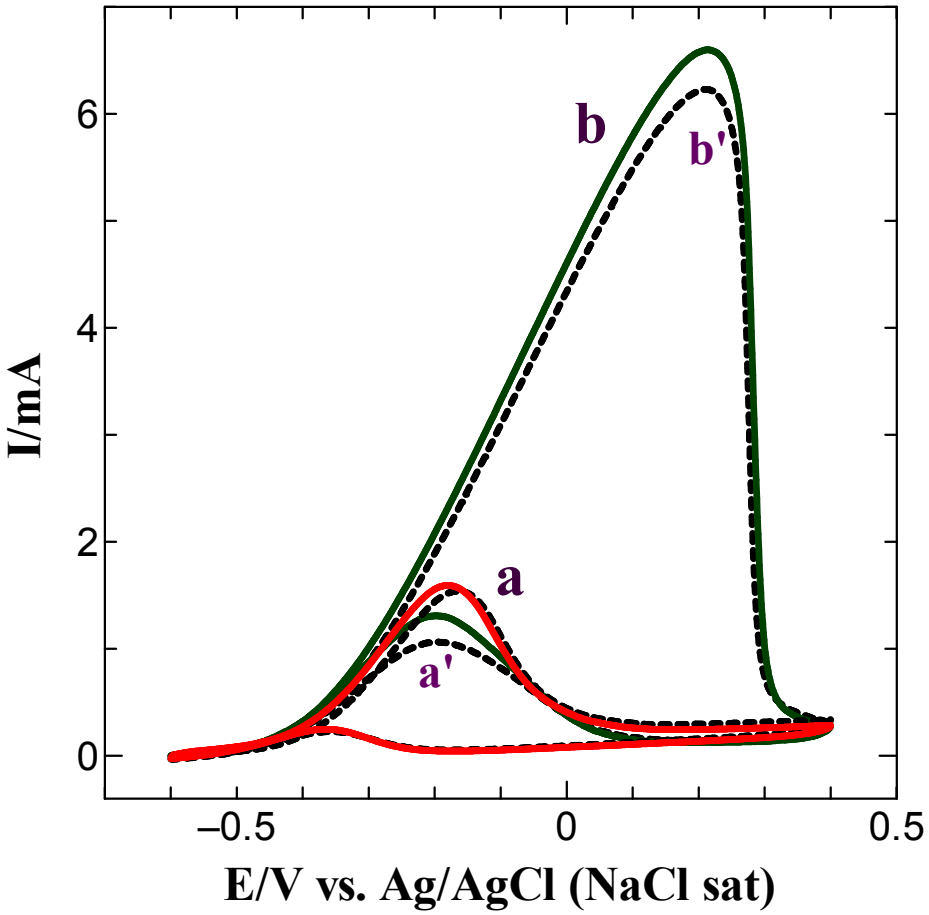

Fig. S9. CVs obtained for 1 M methanol at (a) Pt/C and (b) Au-PtNPs modified GC electrodes in 1.0 M KOH (Solid line: (a and b) 1st cycle, dashed line: (a' and b') after 100 cycles).

Table S1. Impedance spectral data.

Parameter	Bare GCE	GCE/HDA/ PtNPs	GCE/HDA/ AuNPs	GCE/HDA/ Au-PtNPs
R_s (kΩ)	0.149	0.086	0.086	0.172
C (μF)	2.93×10^{-6}	1.59×10^{-6}	1.61×10^{-5}	1.13×10^{-6}
R_{CT} (kΩ)	37.77	25.89	21.47	9.22
k_{et} (cm s^{-1})	1.01×10^{-4}	1.47×10^{-4}	1.77×10^{-4}	4.12×10^{-3}