Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.
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Supporting Information

Au-Pt Alloy Nanocatalysts for Electro-oxidation of Methanol and their Application for Fast-response Non-enzymatic Alcohol Sensing

Liyan Zhao, Joseph P. Thomas, Nina F. Heinig, Marwa Abd-Ellah, Xiongyao Wang, K. T. Leung

WATLab and Department of Chemistry, University of Waterloo,
Waterloo, Ontario, Canada N2L 3G1

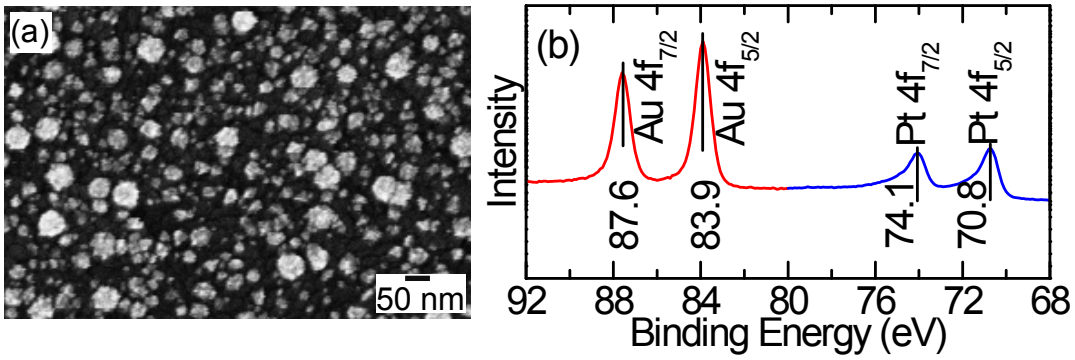

Figure S1. SEM images (a)and XPS spectra (b) of the Au 4f and Pt 4f regions for Au-Pt alloy NPs supported on ITO-glass substrates by electrodeposition at –0.3 V for 5 s in a solution of 1 mM $PtCl_4$, 1 mM $AuCl_3$ and 0.1 M $NaClO_4$ on an ITO-glass substrate..

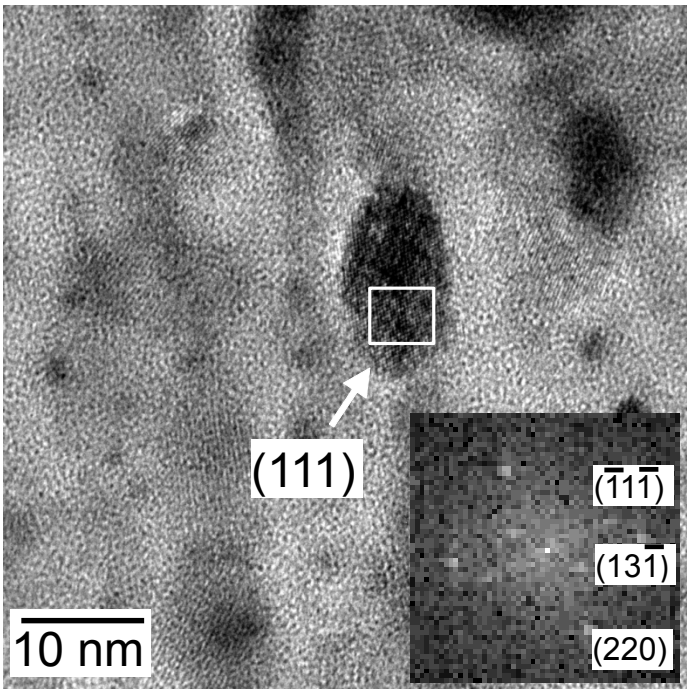

Figure S2. HRTEM image and the corresponding Fourier transform (inset) of a typical AuPt alloy nanoparticle.

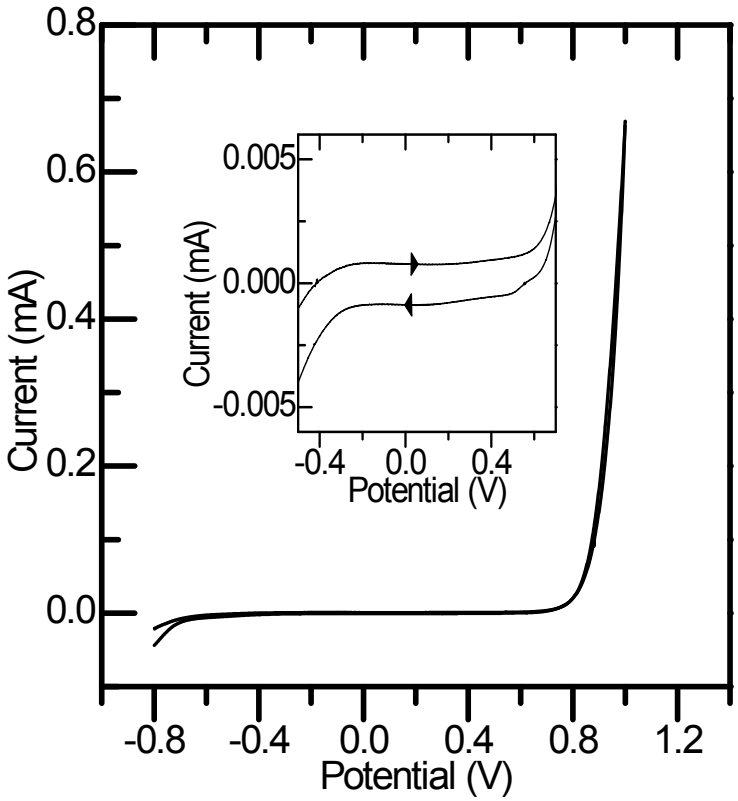

Figure S3. Cyclic voltammogram at a scan rate of 10 mV/s for an ITO-glass substrate in 0.5 M KOH and 0.5 M methanol. The inset shows an enlarged view, with the scan directions marked by arrows.

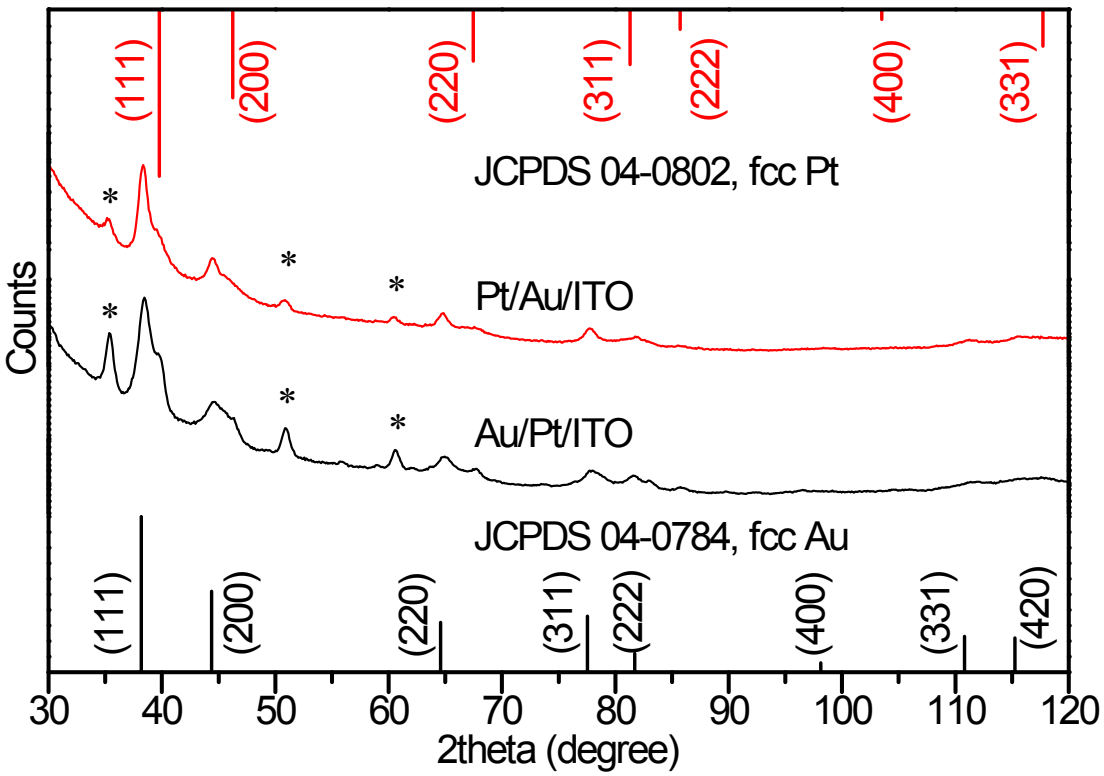

Figure S4. GIXRD of Pt/Au NPs, Au/Pt NPs on ITO-glass substrates and the reference patterns of fcc Au (JCPDS 04-0784) and fcc Pt (JCPDS 04-0802). The peaks corresponding to the ITO-glass substrate are marked with asterisks (*).

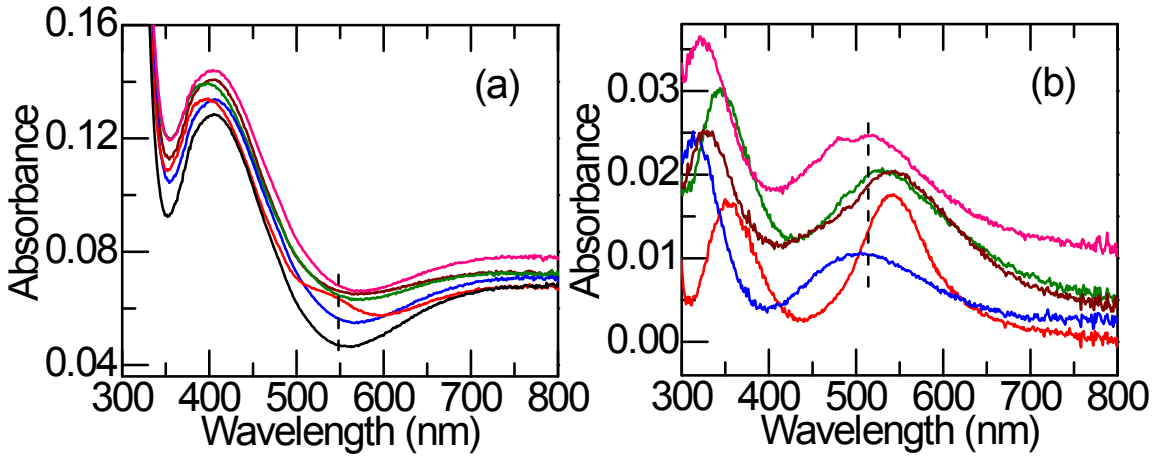

Figure S5. (a) UV-Visible spectra (from bottom to top along the dashed line) for ITO substrate, and Pt NPs, Au NPs, Au/Pt NPs, Pt/Au NPs and Au-Pt alloy NPs, all supported on ITO-glass substrates. These spectra are collected in transmission mode using an integrating sphere. (b) UV-Visible spectra (from bottom to top along the dashed line) for Pt NPs, Au NPs, Pt/Au NPs, Au/Pt NPs and Au-Pt alloy NPs all supported on ITO-glass substrates. These spectra are collected in a dual beam setup, in which the NP-modified ITO substrate is exposed to the sample beam while a blank ITO substrate is exposed to the reference beam. While this method has been widely used in the literature, this method clearly produces erroneous results. In particular, the various features, including the broad feature found between 400 nm and 600 nm, are caused by this subtraction method because the ITO thicknesses for all the samples are not necessarily the same as the blank ITO substrate.

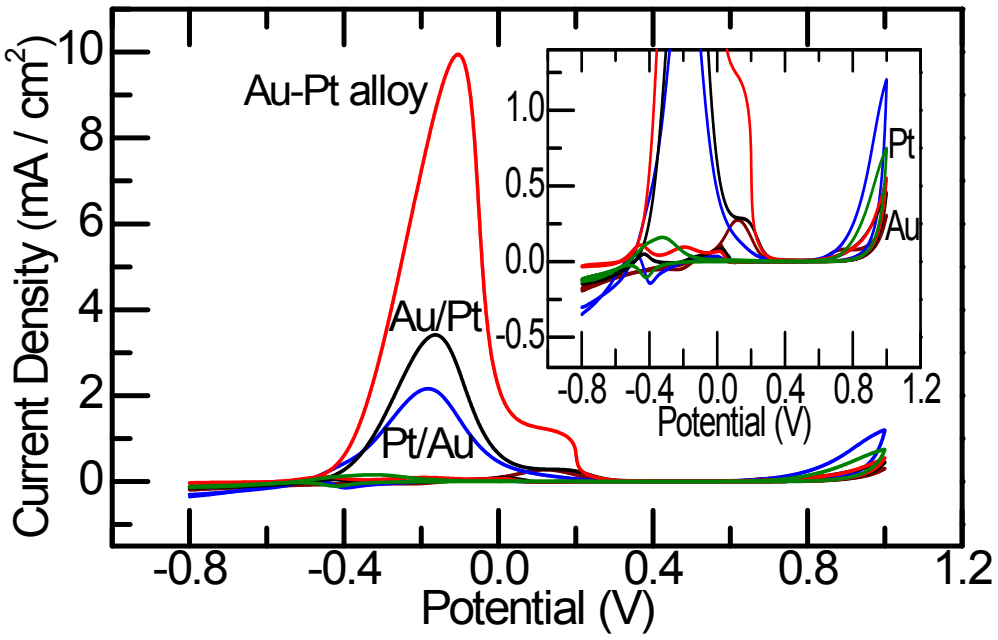

Figure S6. Cyclic voltammograms in a solution of 0.5 M ethanol and 0.5 M KOH for Pt NPs, Au NPs, Au/Pt NPs, Pt/Au NPs and Au-Pt alloy NPs, all supported on ITO-glass substrates.

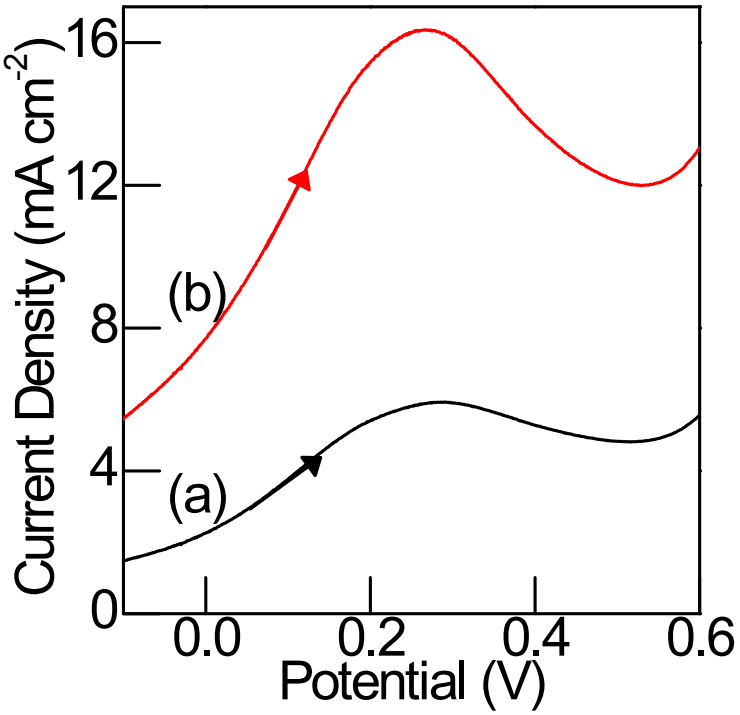

Figure S7. Linear sweep voltammetric scans in a solution of 5 mM ethanol and 0.5 M KOH at a scan rate of 10 mV/s for Au-Pt alloy NPs modified ITO-glass electrodes, which were electrodeposited at –0.3 V for (a) 1 s and (b) and 5 s in a solution of 1 mM $PtCl_4$, 1 mM $AuCl_3$ and 0.1 M $NaClO_4$. The scan directions are marked by arrows.