Electronic Supplementary Material (ESI) for Green Chemistry

Supporting Information

Template-free Synthesis of Electroactive Au-Calix-PPY nanocomposite for Electrochemical Sensor Appplications

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Synthesis of Calix-PPY

To a stirring solution of Pyrrole (2 ml prepared by diluting 2 µl PPY with 1 M HCl), 4-sulfocalix[4]arene (2 ml, 1 mM) and ammonium persulphate (6 mg in 2 ml, 1 M HCl) was added and reaction was carried out for 12 h. After the polymerization, the solution was centrifuged at 20000 RPM for 15 min. The residue was washed 2-3 times with DD water and ethanol to remove excess dopant and monomeric species followed by vacuum drying to yield an amorphous solid (yield = 80±2 %).

Synthesis of Au-Calix-PPY

To a stirring solution of pyrrole (5 ml, 1 mM), 4-sulfocalix[4]arene (5 ml, 1 mM) was added at room temperature. Then 5 ml solution of $HAuCl_4$ (1 mM) was added quickly. The reaction solution turned black within 2 min due to polymerization of pyrrole and it was kept stirring for 4 h. After the polymerization it was centrifuged, washed and dried same as the procedure for preparing Calix-PPY, to yield an amorphous solid (yield = 85±2 %). The effect of $HAuCl_4$ and calixarene concentration on particle size was examined. The oxidation of pyrrole and reduction of Au occur simultaneously (as shown in Scheme 1).

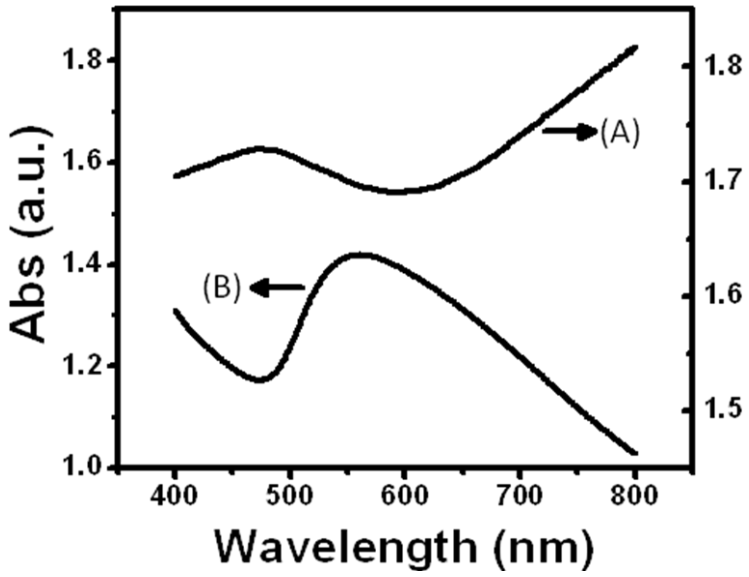

Figure S1. Absorption spectra of Calix-PPY 476 nm (A) and Au-Calix-PPY 560 nm (B).

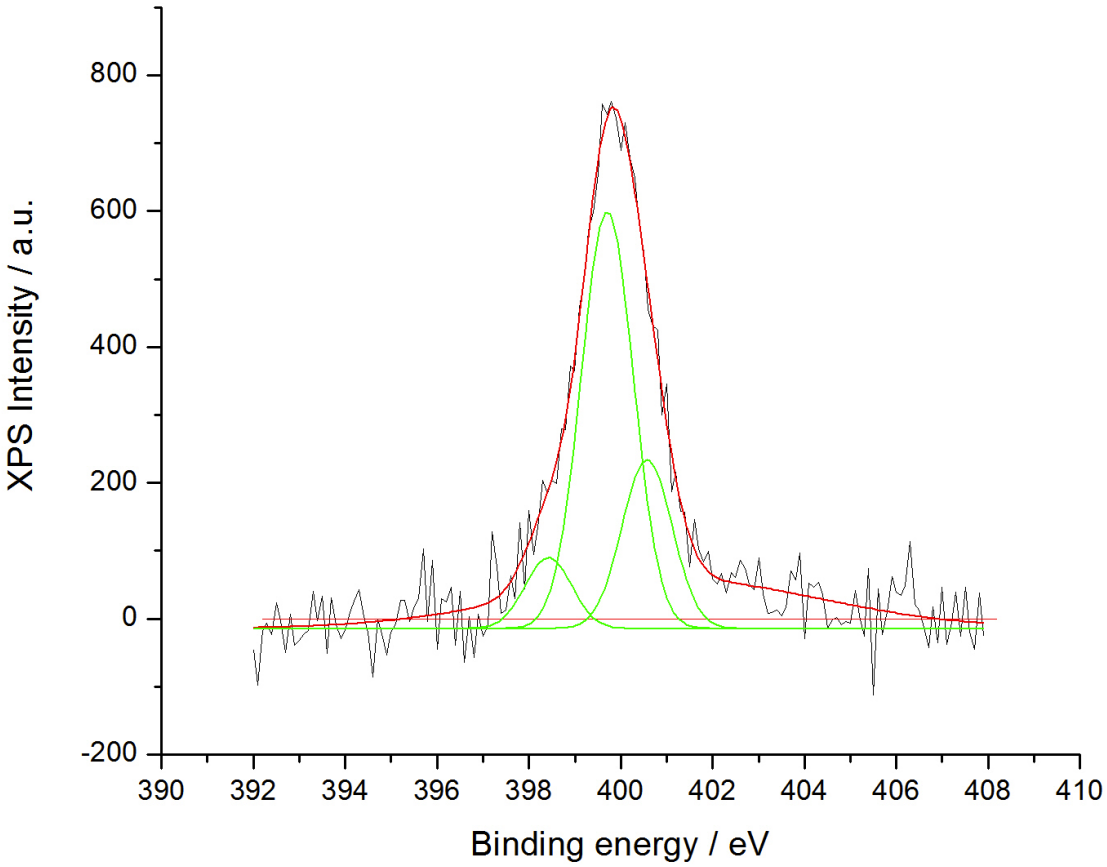

Figure S2. XPS N 1s core-level spectra of Au-Calix-PPY nanocomposite.

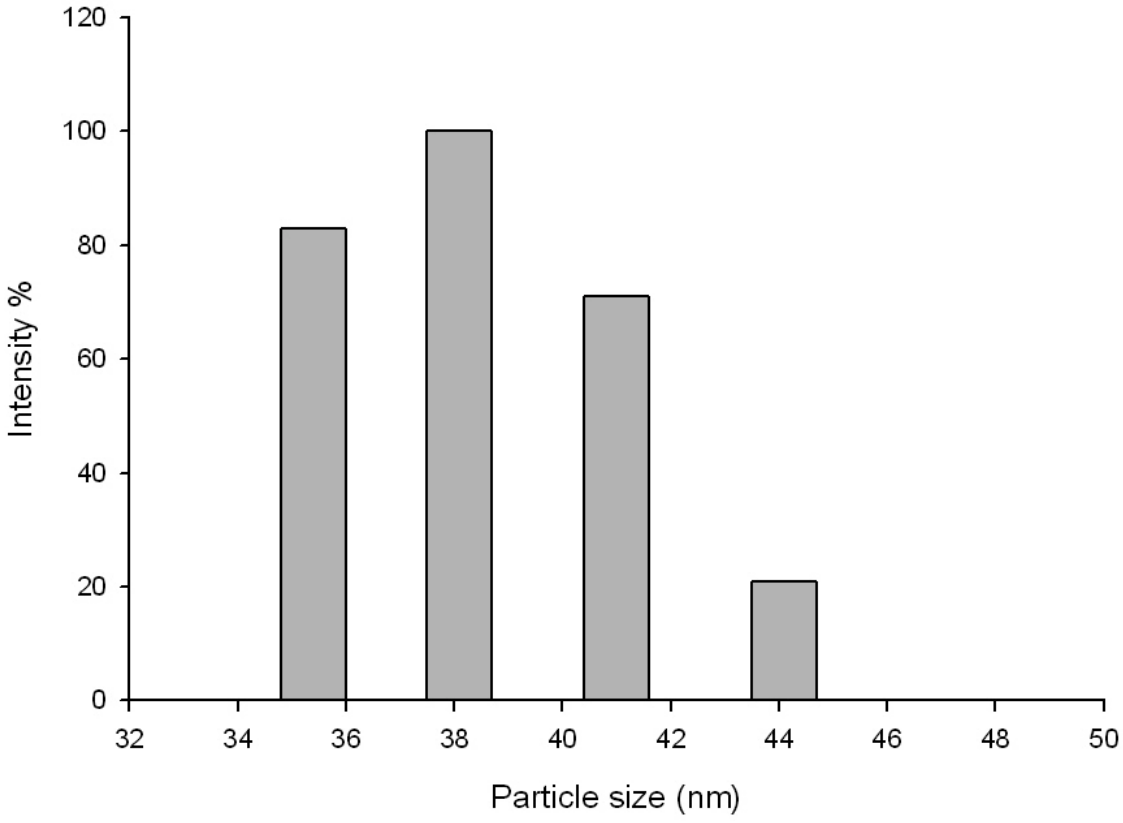

Figure S3. DLS histogram for the dispersion of Au-Calix-PPY nanocomposite material.

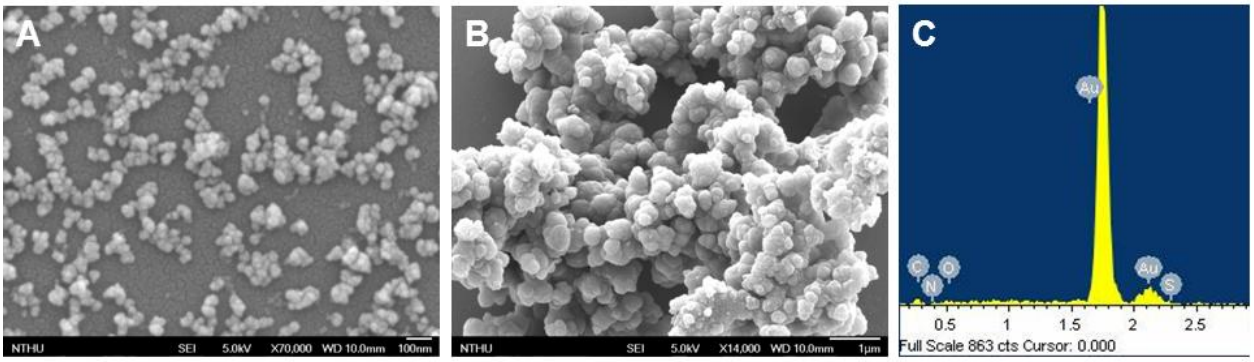

Figure S4. Scanning electron micrographs of (A) Au-Calix-PPY (B) Calix-PPY and (C) EDX spectrum of Au-Calix-PPY nanocomposite.

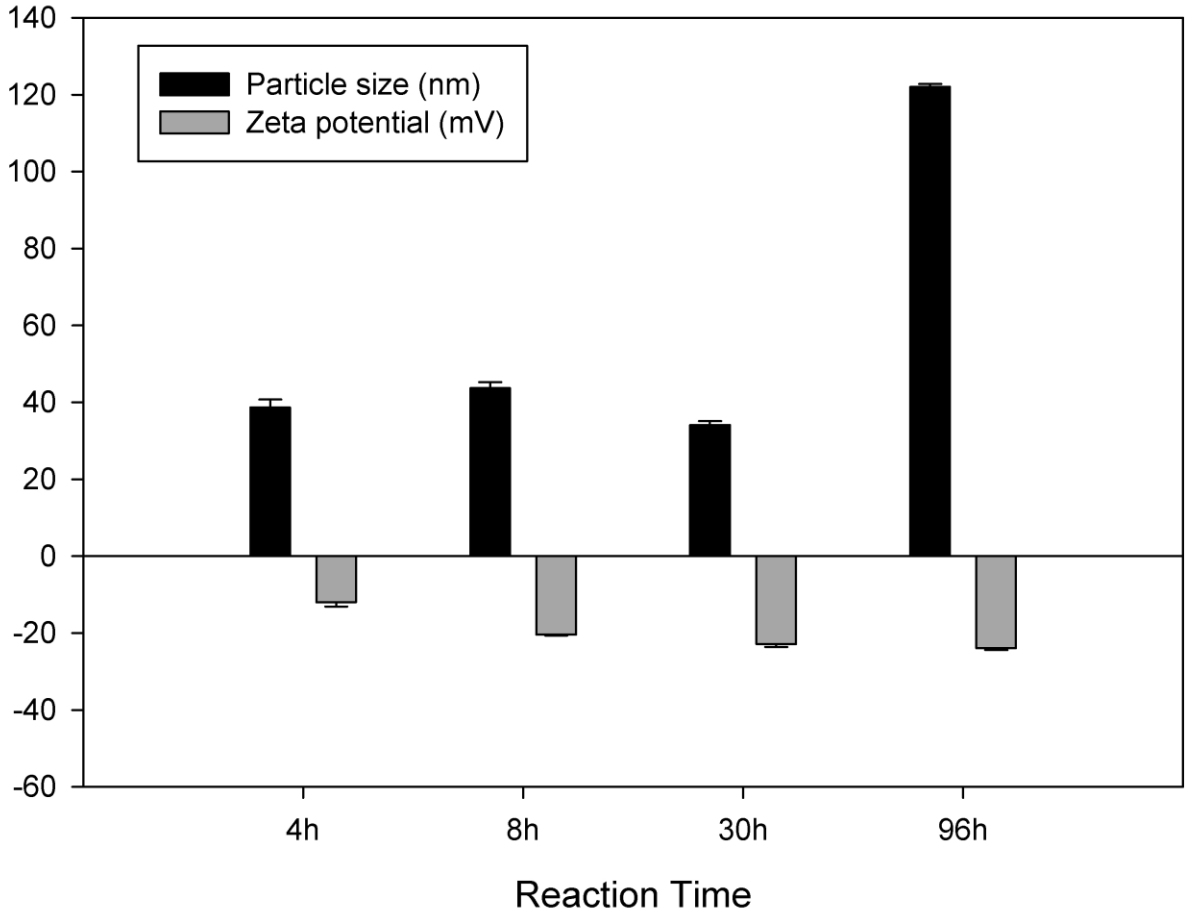

Figure S5. Effect of reaction time on particle size and zeta potential of Au-Calix-PPY nanocomposite measured by Dynamic Light Scattering (DLS) and Zeta Potential Analyzer.

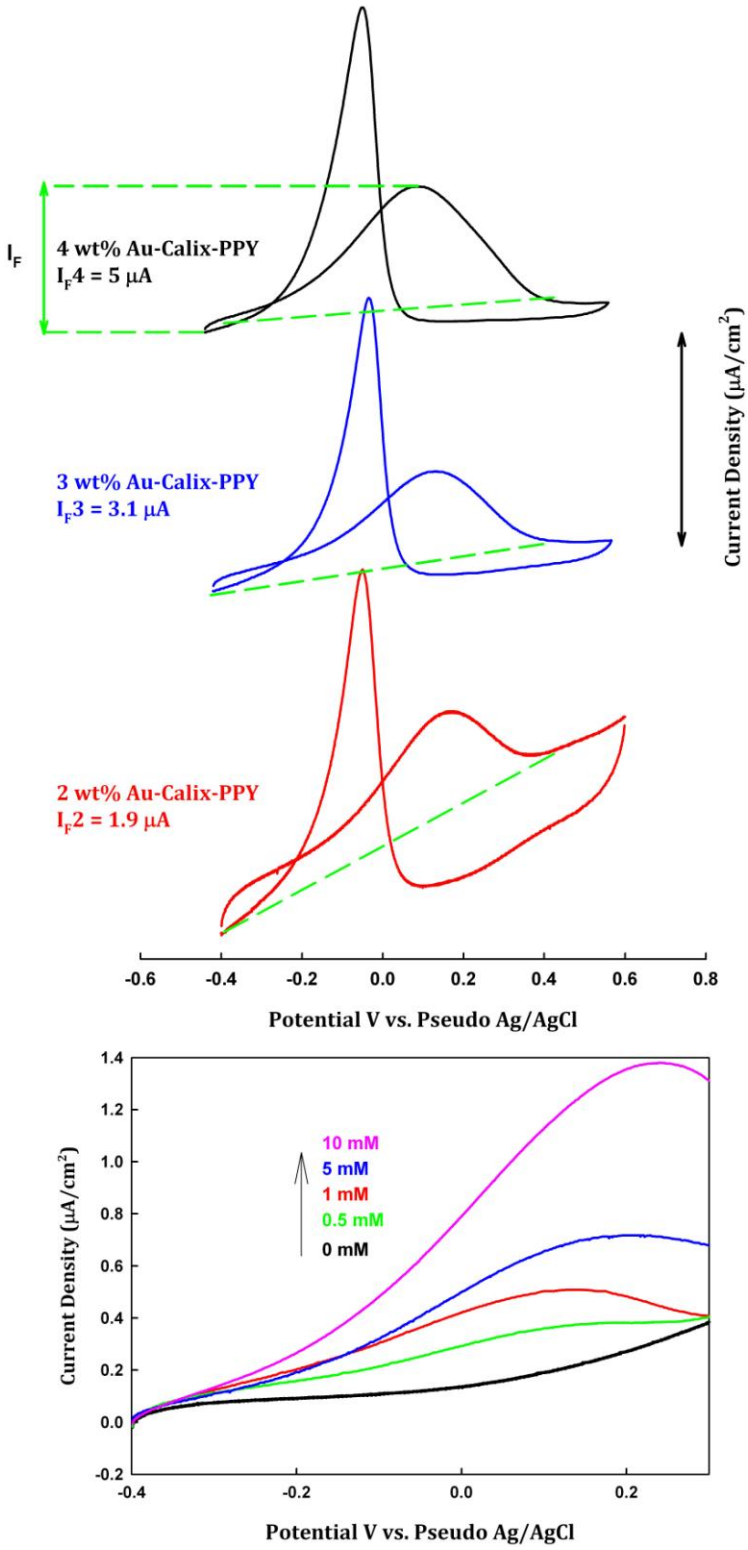

Figure S6. (A) CV responses of different wt% Au-Calix-PPY-modified electrodes toward 0.01 M formaldehyde in 1 mM NaOH solutions with a scan rate of 50 mV/s. and (B). LSV for different concentration of formaldehyde at the Au-Calix-PPY-modified electrode with a scan rate of 50 mV/s.

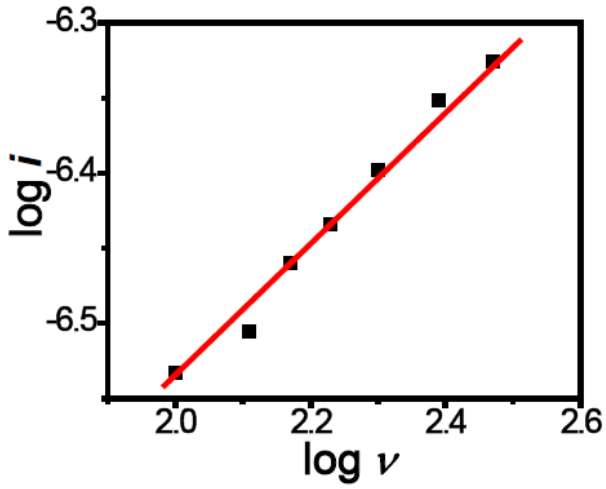

Figure S7 Logarithmic plot of anodic peak current versus scan rate.

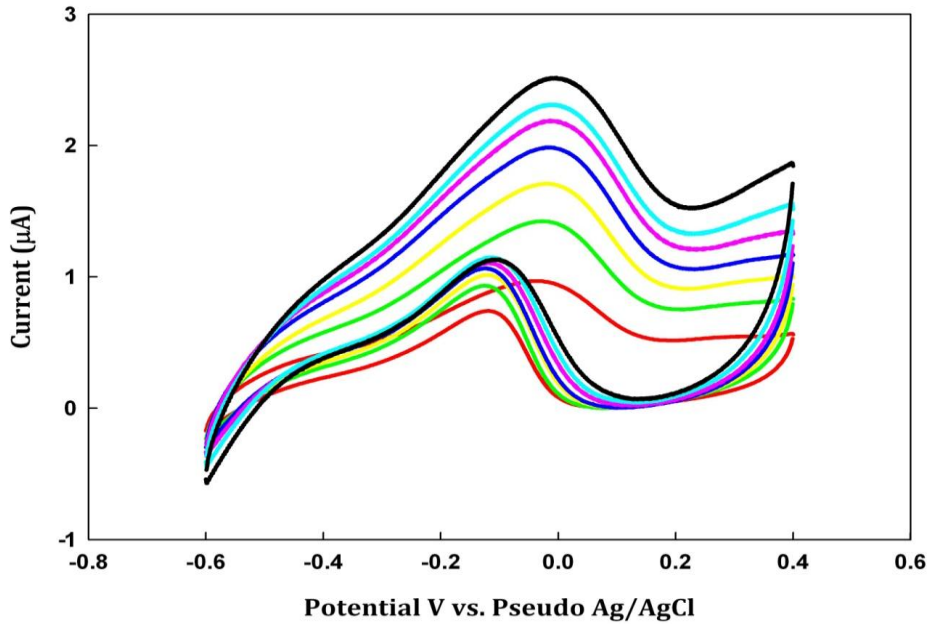

Figure S8. CV responses for Au-Calix-PPY-modified electrodes toward 0.01 M glucose in 0.47 M NaOH solution with different scan rate varying from 30 mV/s to 200mV/s.

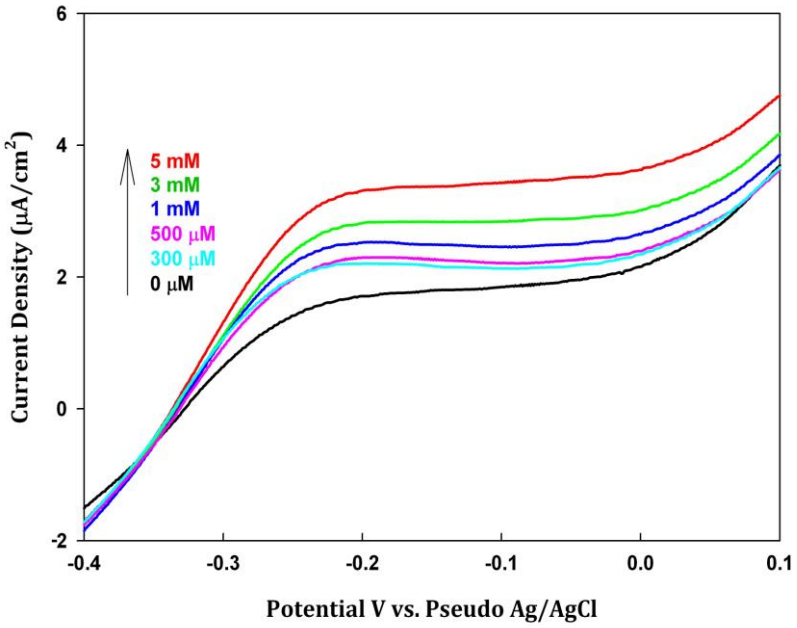

Figure S9. LSVs for different concentration of glucose obtained at the Au-Calix-PPY-modified electrode with a scan rate of 50 mV/s.