Supplementary Information

Inhibition of CO poisoning on Pt catalyst coupled with the reduction of toxic hexavalent chromium in a dual-functional fuel cell

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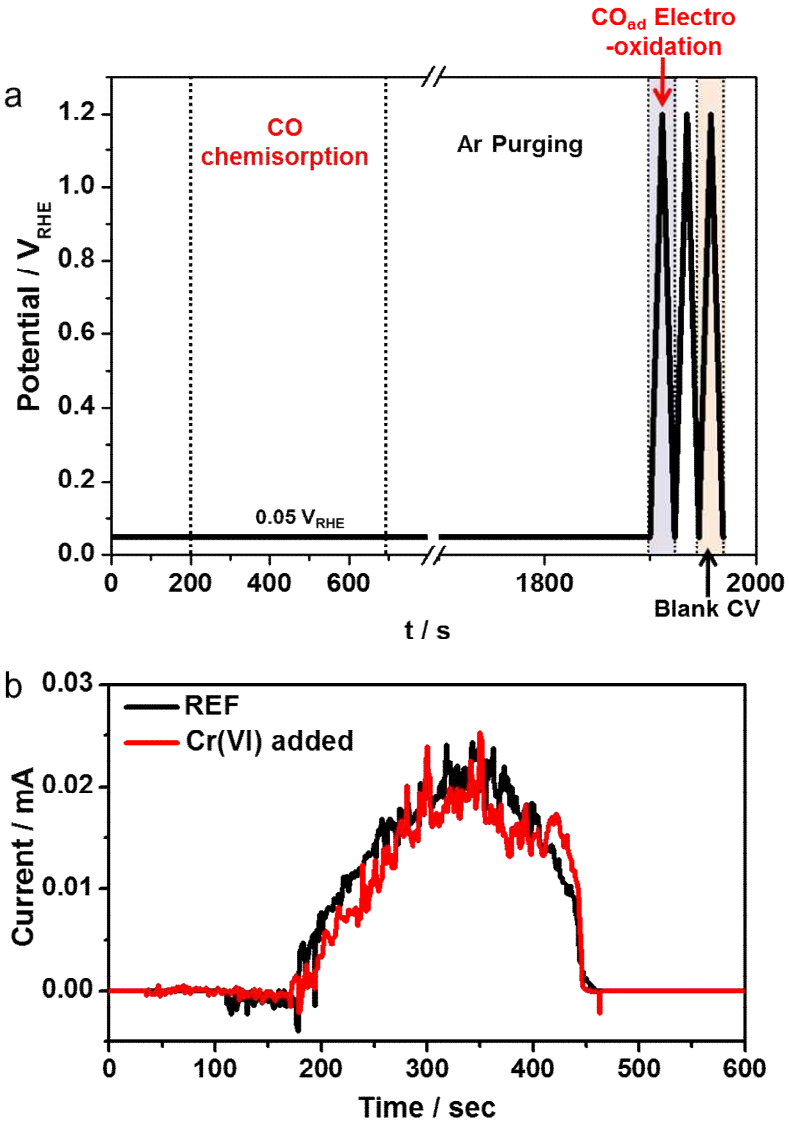

Figure S1. (a) the schematic illustration of the CO electro-oxidation measurement. During chemisorption of CO on Pt surface, potential was held at 0.05 V (vs. RHE) and after fully adsorbing CO, Ar purging was done to remove the dissolved CO in the electrolyte. After Ar purging, cyclic voltammetry was conducted at 0.05 to 1.2 V (vs. RHE), three times. The first scan shows the CO electro-oxidation features and second, third scan shows general CV under Ar conditions. (b) Current measurements during CO adsorption on Pt nanoparticle surface (corresponding to CO chemisorption region in the above (a) panel). By introducing CO gas, the anodic current appeared between 200 to 450 s in both cases, which represents the desorption of underpotentially deposited proton, and this current directly translates to the amount of CO adsorption on Pt surface.

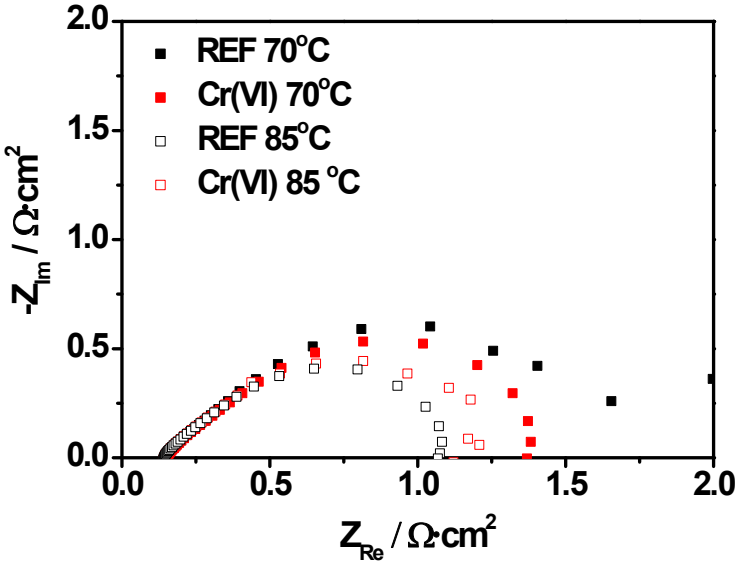

Figure S2. EIS results of each sample obtained at 70 °C and 85 °C. EIS was conducted according to the applied voltages at 0.4 V with amplitude of 10 mV and in the frequency range from 0.1 Hz to 10 kHz. 1 M of methanol in anode and 200 mL min^{-1} of air in cathode were supplied.

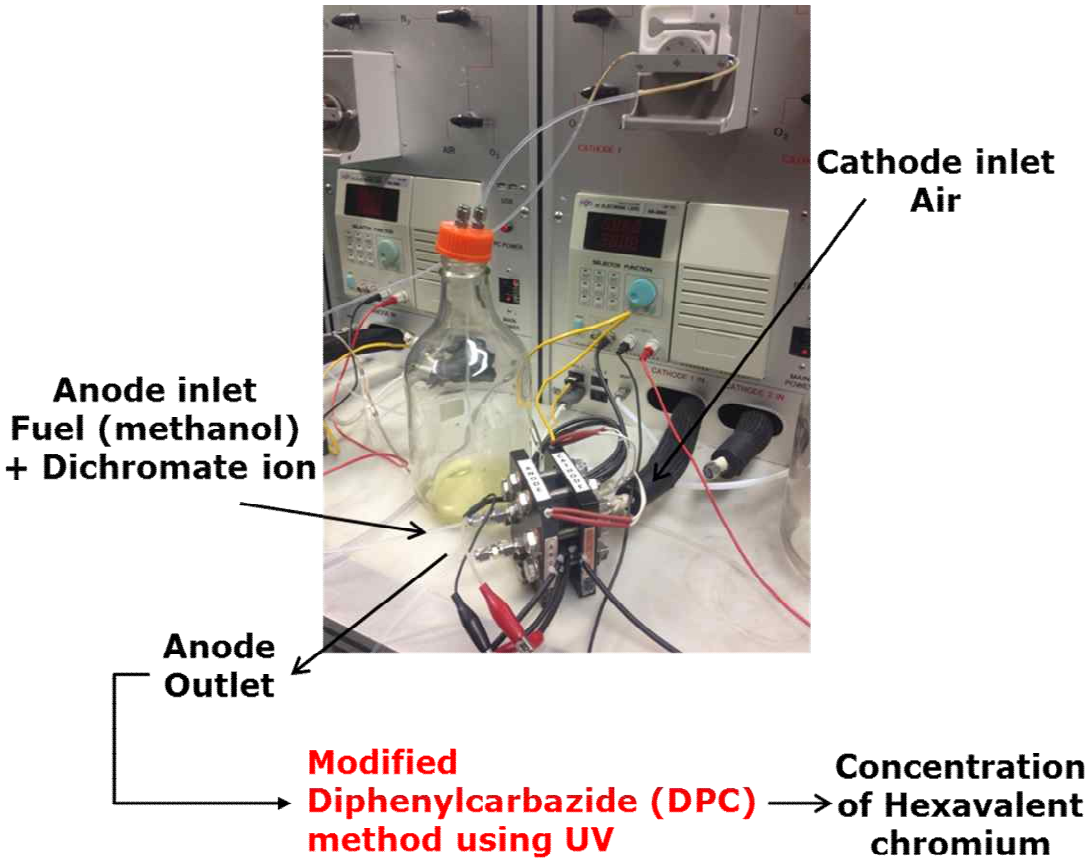

Figure S3. Photograph of DMFC setup

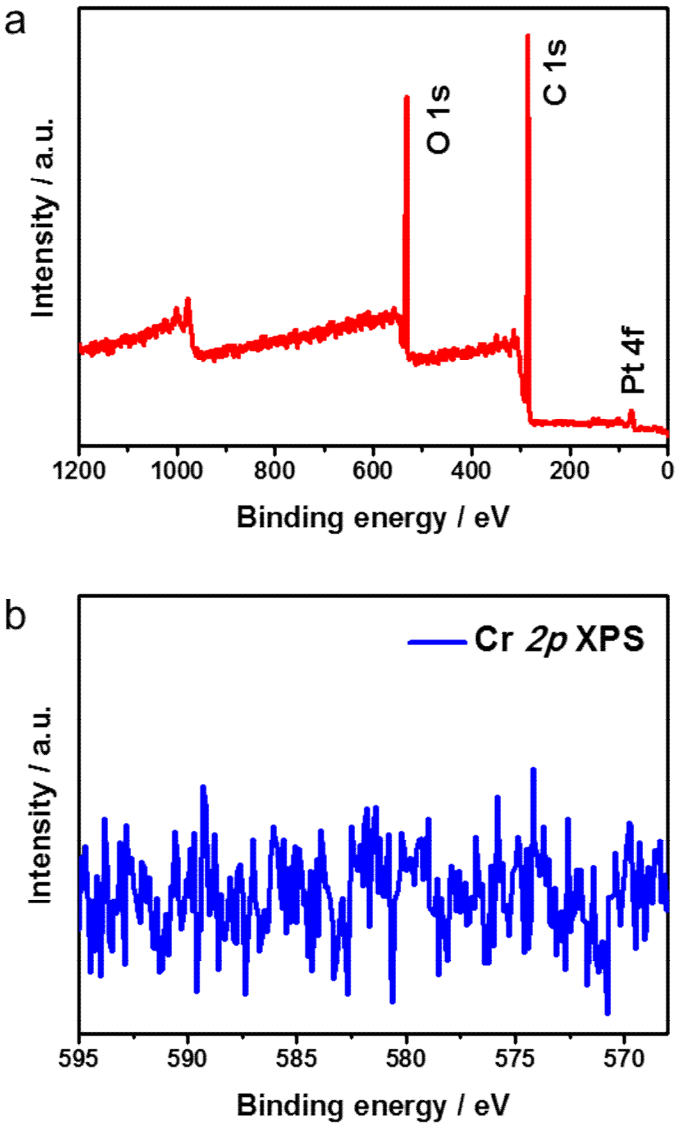

Figure S4. XPS spectra of anode catalyst after DMFC operation for 1 hour; (a) survey and (b) Cr *2p* region.

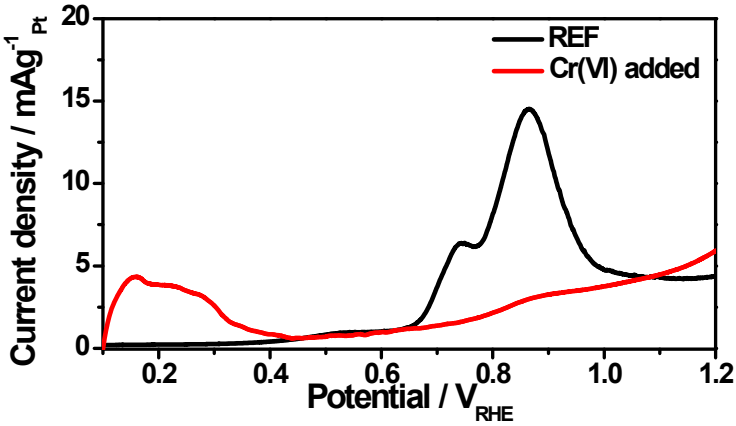

Figure S5. Cyclic voltammograms analysis of CO electro-oxidation reaction by direct Cr(VI) addition to the solution