

Enabling methanol oxidation by interacting hybrid quantum system of spinel Co_3O_4 nanoparticles decorated MXene

Kashmiri Baruah, Pritam Deb

Department of Physics, Tezpur University (Central University), Napaam, Tezpur, 784028, Assam,

India

Supplementary Information

Results

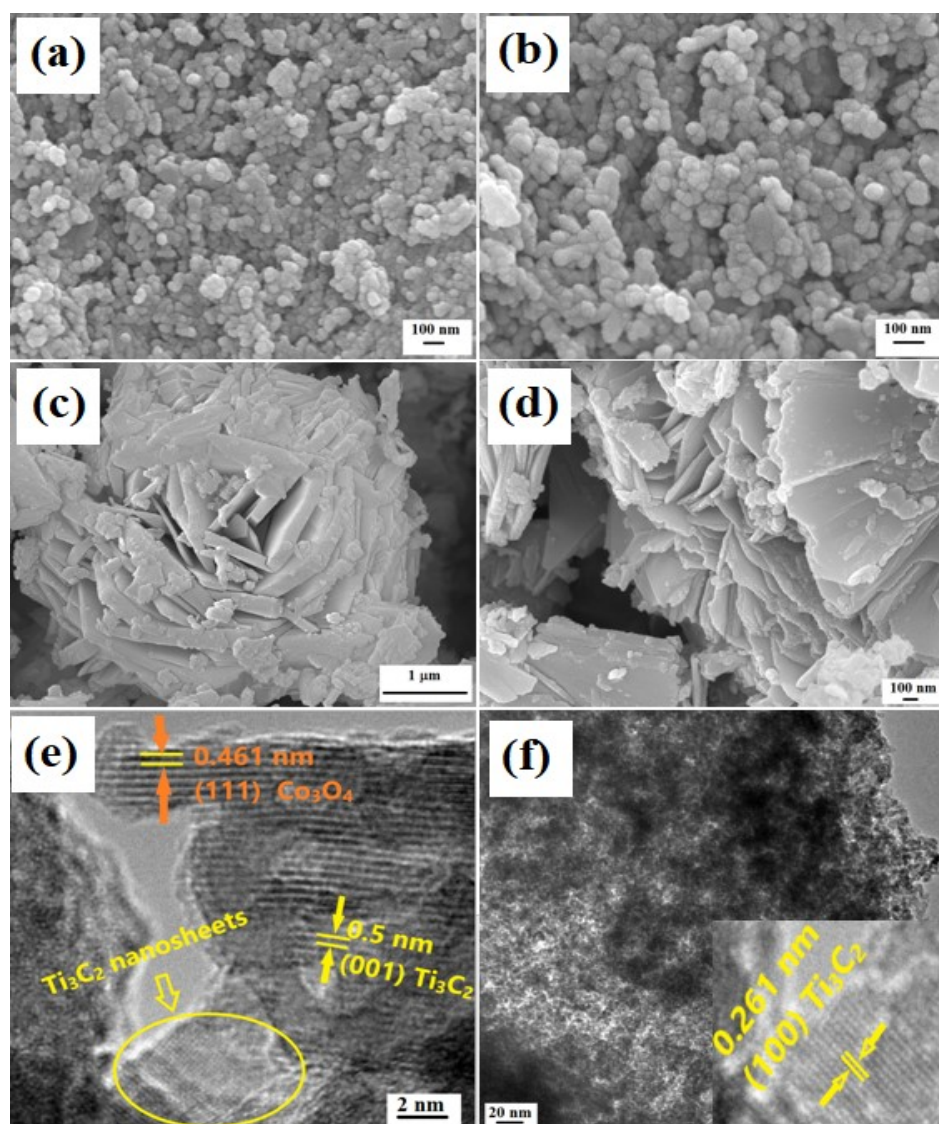


Figure S1: FESEM images of (a), (b) Co_3O_4 nanoparticles; (c), (d) $\text{Ti}_3\text{C}_2/\text{Co}_3\text{O}_4$; (e)-(f) HRTEM images of $\text{Ti}_3\text{C}_2/\text{Co}_3\text{O}_4$. (Inset in fig. f is the lattice fringes of Ti_3C_2 nanosheets shown inside circle in fig. e)

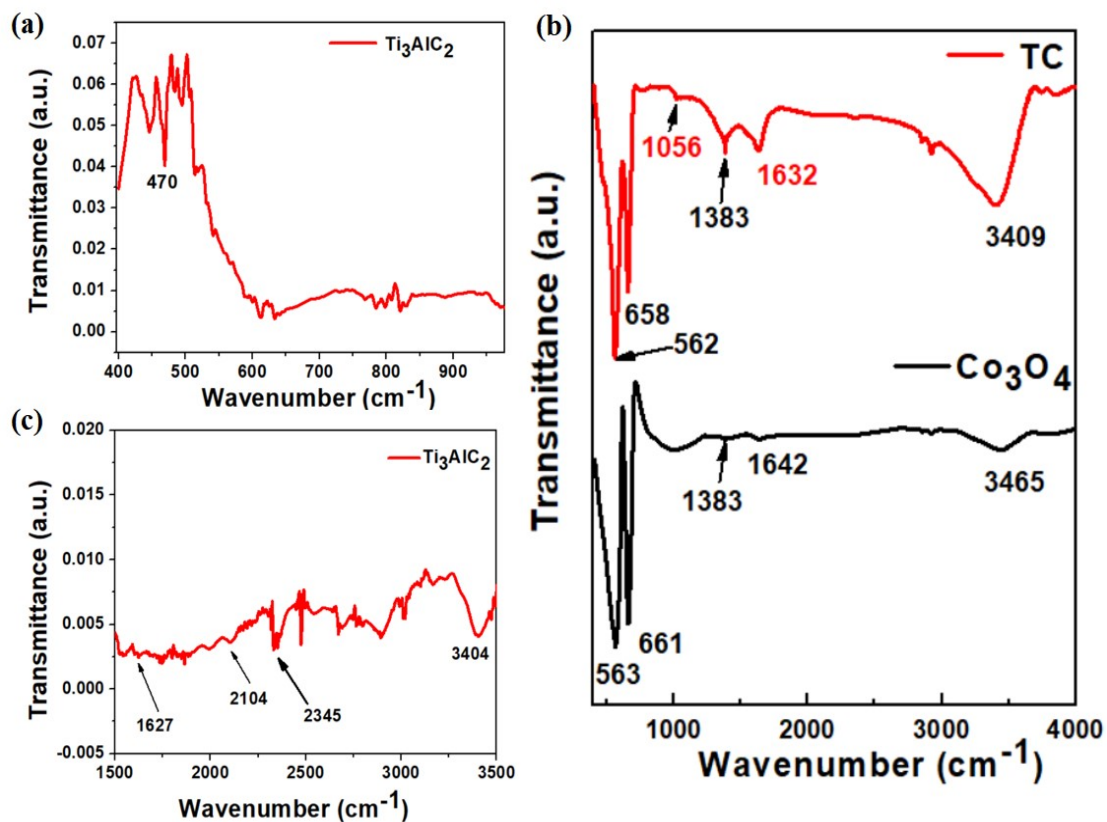


Figure S2: FTIR spectra of (a), (c) Ti_3AlC_2 , and (b) Co_3O_4 nanoparticles and nanocomposite TC.

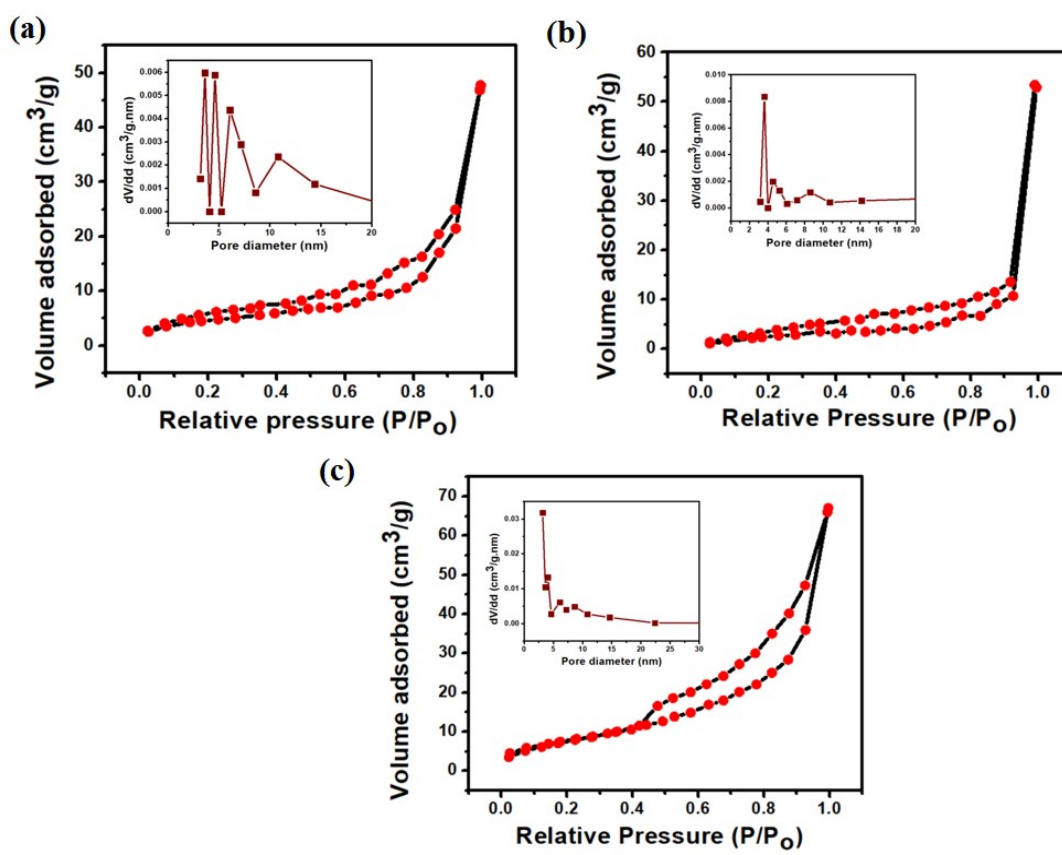


Figure S3: N₂ adsorption-desorption isotherms of (a) Ti₃C₂, (b) Co₃O₄ and (c) TC nanocomposite. Pore size distribution curves of the corresponding samples are shown in inset.

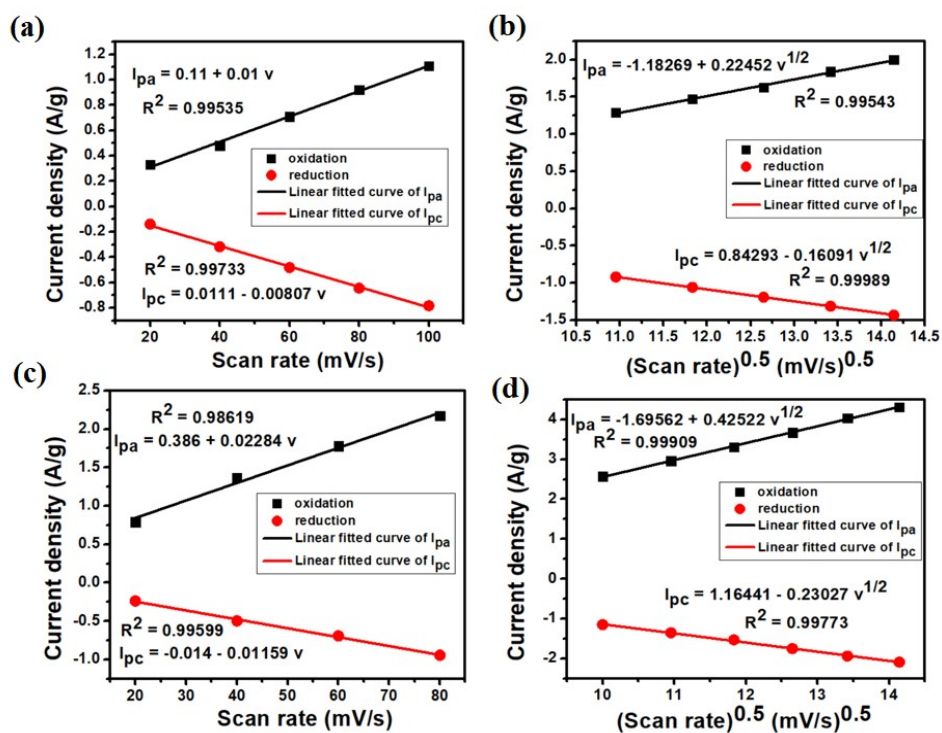


Figure S4: Plot of (a) I_p vs. v , (b) I_p vs. $v^{1/2}$ of Co₃O₄/GC, (c) I_p vs. v , (d) I_p vs. $v^{1/2}$ of Ti₃C₂/Co₃O₄/GC

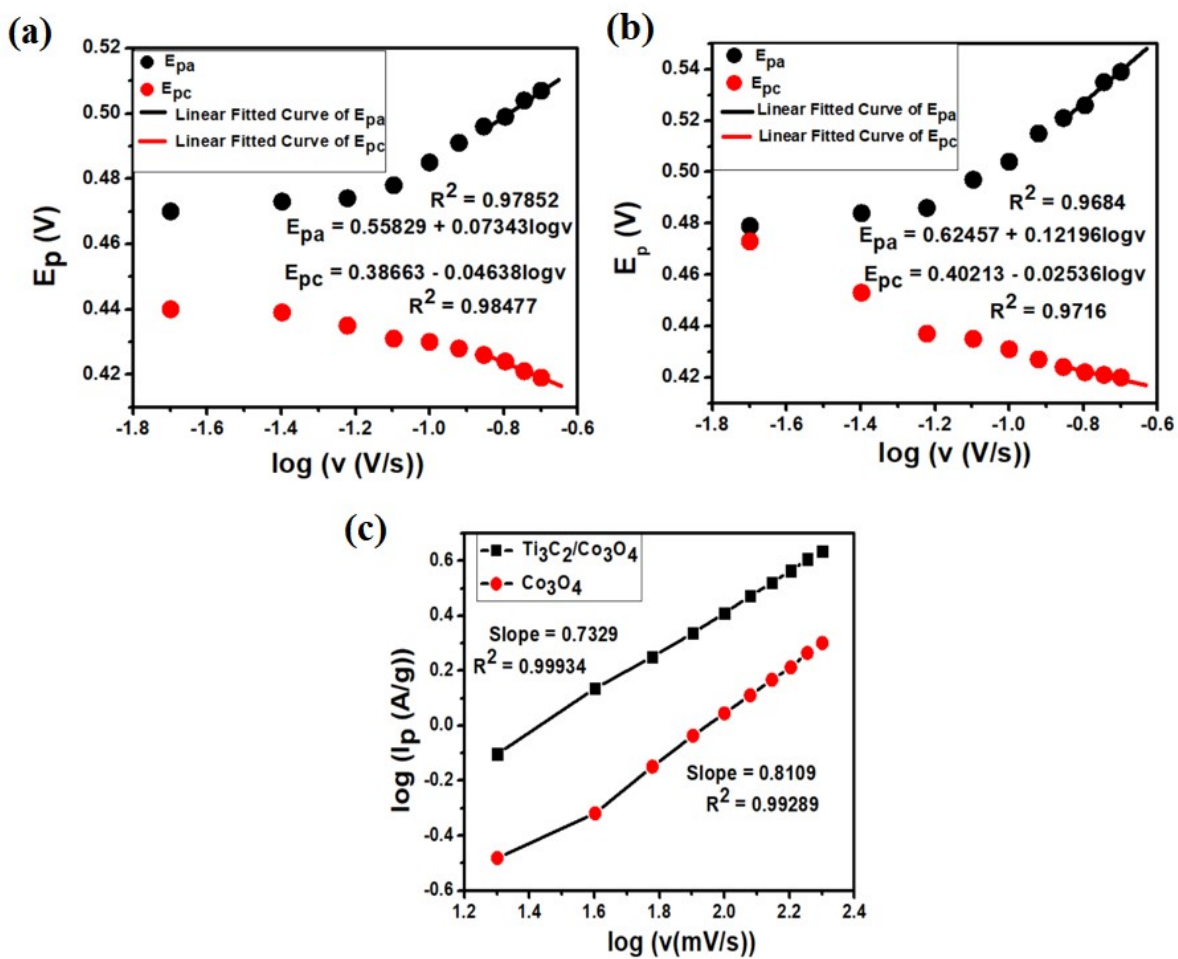


Figure S5: Laviron's plot: Anodic and cathodic peak potential (v) vs logarithm of scan rate (a) $\text{Co}_3\text{O}_4/\text{GC}$, (b) TC/GC , (c) Plot of logarithm of peak anode current density vs. logarithm of scan rate

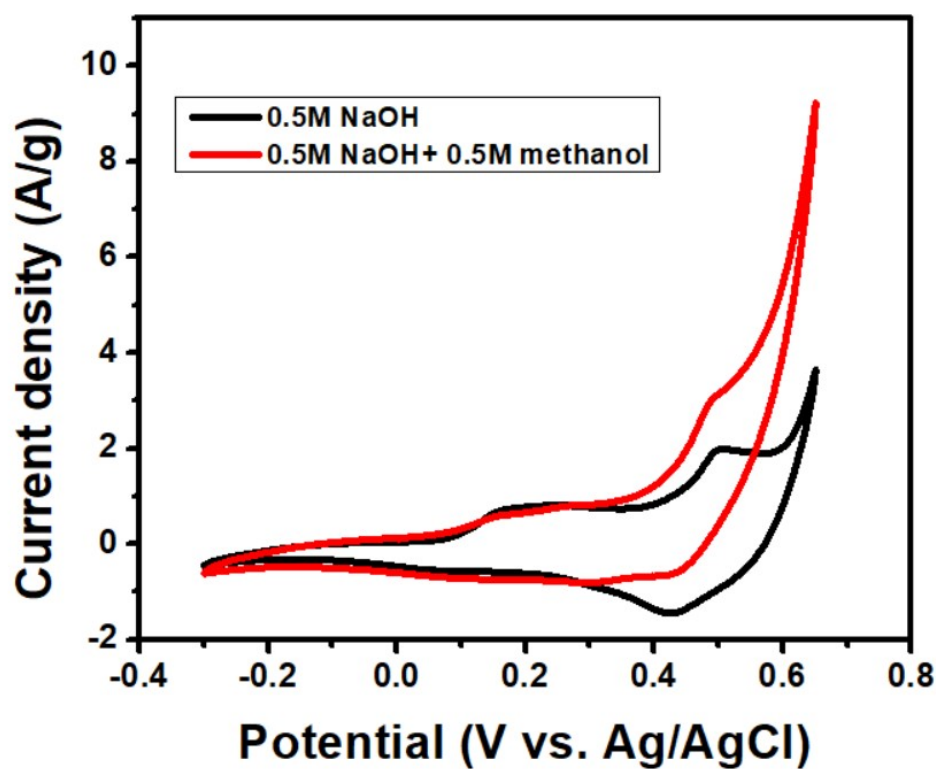


Figure S6: Cyclic voltammetry of $\text{Co}_3\text{O}_4/\text{GC}$ in 0.5M NaOH supporting electrolyte in the presence and absence of 1.5M methanol at 200 mV/s.

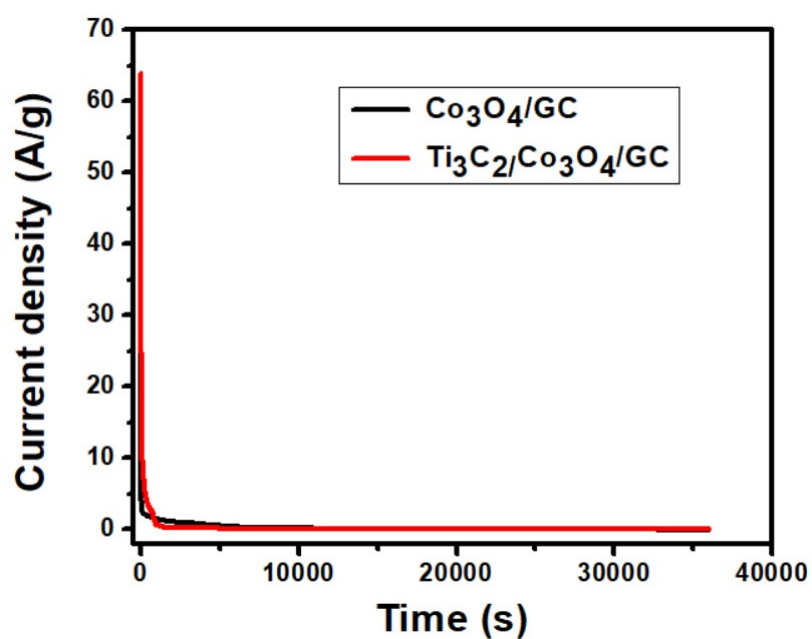


Figure S7: Chronoamperogram of $\text{Co}_3\text{O}_4/\text{GC}$ and $\text{Ti}_3\text{C}_2/\text{Co}_3\text{O}_4/\text{GC}$ electrodes in 0.5 M NaOH aqueous solution containing 1.5 M methanol at 0.65 V for 10 hours

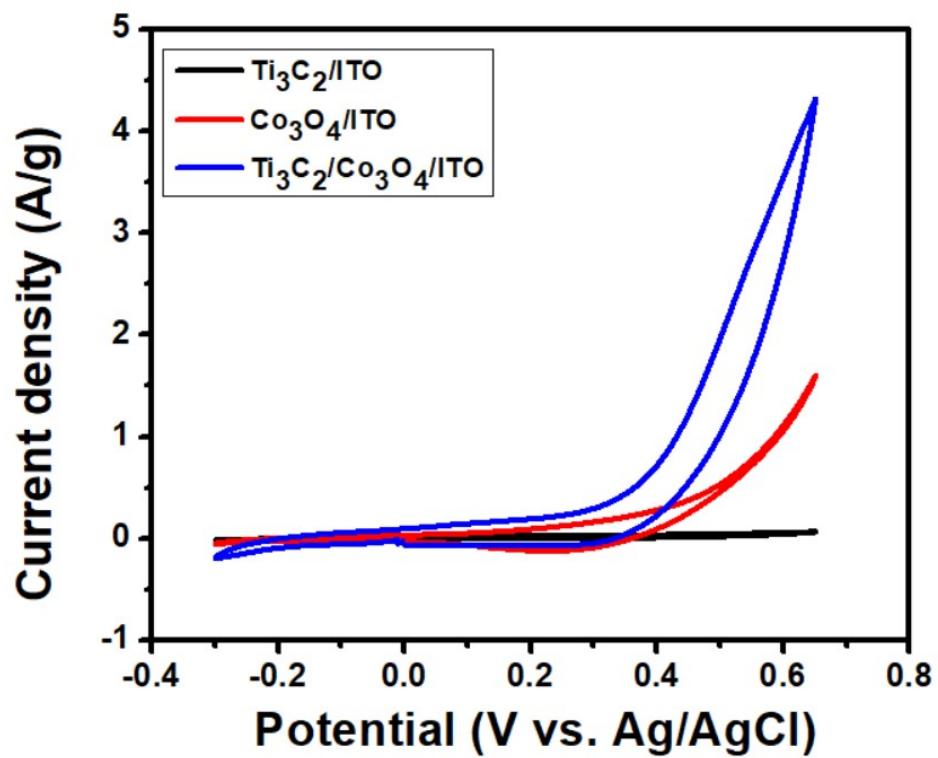


Figure S8: Cyclic voltammogram of $\text{Ti}_3\text{C}_2/\text{ITO}$, $\text{Co}_3\text{O}_4/\text{ITO}$ and $\text{Ti}_3\text{C}_2/\text{Co}_3\text{O}_4/\text{ITO}$ in presence of 1.5 M methanol in 0.5 M NaOH supporting electrolyte at 20 mV/s scan rate.