Supporting Information

Efficient CO-Release from the Plasmonic Pt Using 1D $BiVO_4$@TiO_2 Heterojunction for Improved Electrocatalytic and Photoelectrocatalytic Methanol Oxidation

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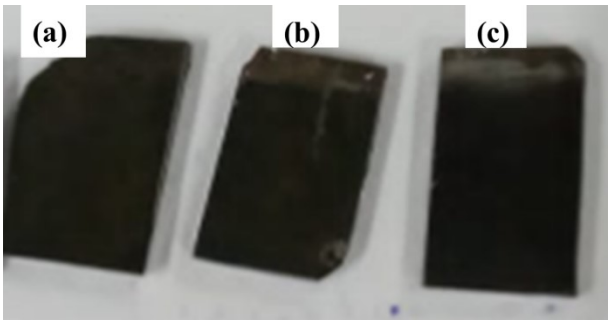
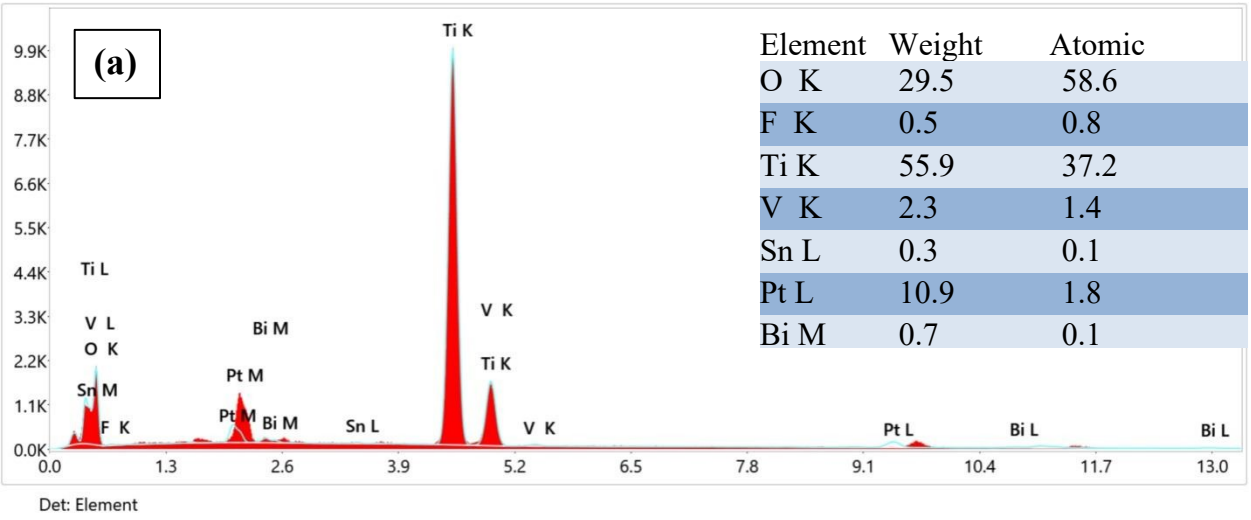


Fig. S1 Optical micrographs of (a) 15-Pt/$BiVO_4$/TiO_2/FTO (a) 10-Pt/$BiVO_4$/TiO_2/FTO (a) 5-Pt/$BiVO_4$/TiO_2/FTO

RESULTS AND DISCUSSION

In **Fig. S2**, Corresponding peaks of FTO (F, Sn, O), TiO_2 (Ti, O), $BiVO_4$ (Bi, V, O) and Pt are shown in EDX spectrum of FTO/ TiO_2 NRs /$BiVO_4$/Pt with different cycles. The Atomic % of F, Sn, (FTO), Ti (TiO_2), Bi, V, ($BiVO_4$) and O (FTO, TiO_2 & $BiVO_4$) are almost the same for all samples while Pt atomic% varies.



Element	Weight	Atomic
O K	29.5	58.6
F K	0.5	0.8
Ti K	55.9	37.2
V K	2.3	1.4
Sn L	0.3	0.1
Pt L	10.9	1.8
Bi M	0.7	0.1

Fig.S2 EDX analysis of Pt/$BiVO_4$/TiO_2/FTO (a) 5 cycles (b) 15 cycles

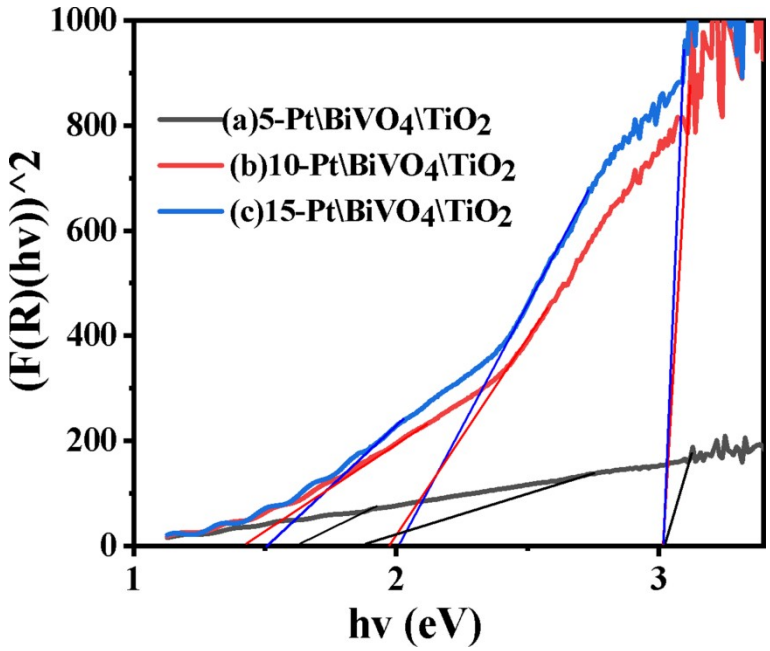


Fig.S3 Tauc plot for Band Gap calculation of $BiVO_4/TiO_2$/FTO nanorods with different cycles of Pt.

GAMRY G3000 in Potentiostatic mode was utilized for conducting electrochemical studies. Firstly, response for Pt/$BiVO_4$/ TiO_2/FTO nanorods electrode was recorded with 1M KOH. There is no oxidation and reduction peaks. Fig. S2 shows the response of Pt/$BiVO_4$/ TiO_2 electrode in KOH electrolyte.

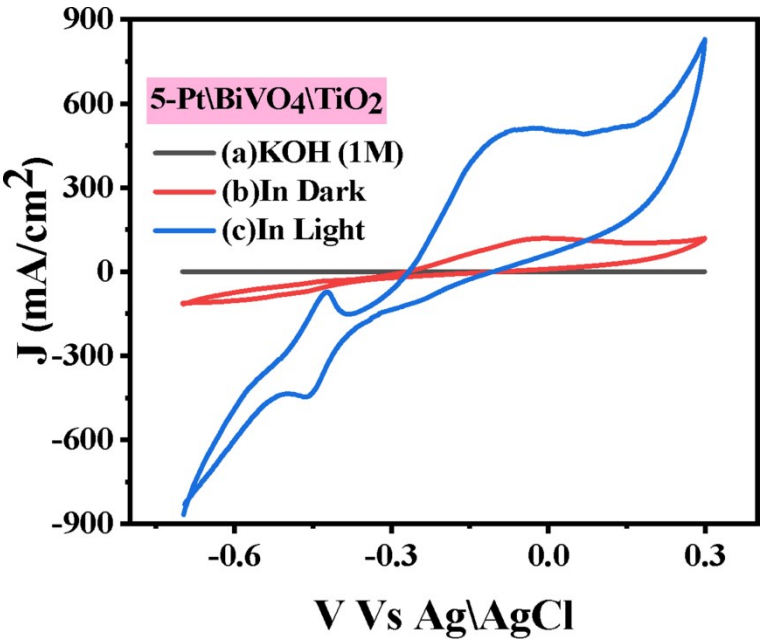


Fig S4. Cyclic Voltammogram of FTO/ TiO_2NRs /$BiVO_4$/Pt at scan rate 100 mV/s at 5 cycles of Pt.

The cyclic voltammetry of FTO/TiO_2/$BiVO_4$/Pt (5 and 15 Cycles) with different scan rates in 1 M methanol has been shown in the **Fig. S5**. As we know that when the scan rate increases from 20mV/s to 100mV/s, the current density is increased according to the reaction kinetics. Under dark the current density is 11.9 mA/cm^2 at -0.02 V and 28.0 mA/cm^2 at -0.13V as compared to light illumination 50.7 mA/cm^2 at -0.07 V and 47.0 mA/cm^2 at -0.12 V for FTO/TiO_2/$BiVO_4$/Pt 5 cycles and FTO/TiO_2/$BiVO_4$/Pt 15 cycles respectively, which is higher.

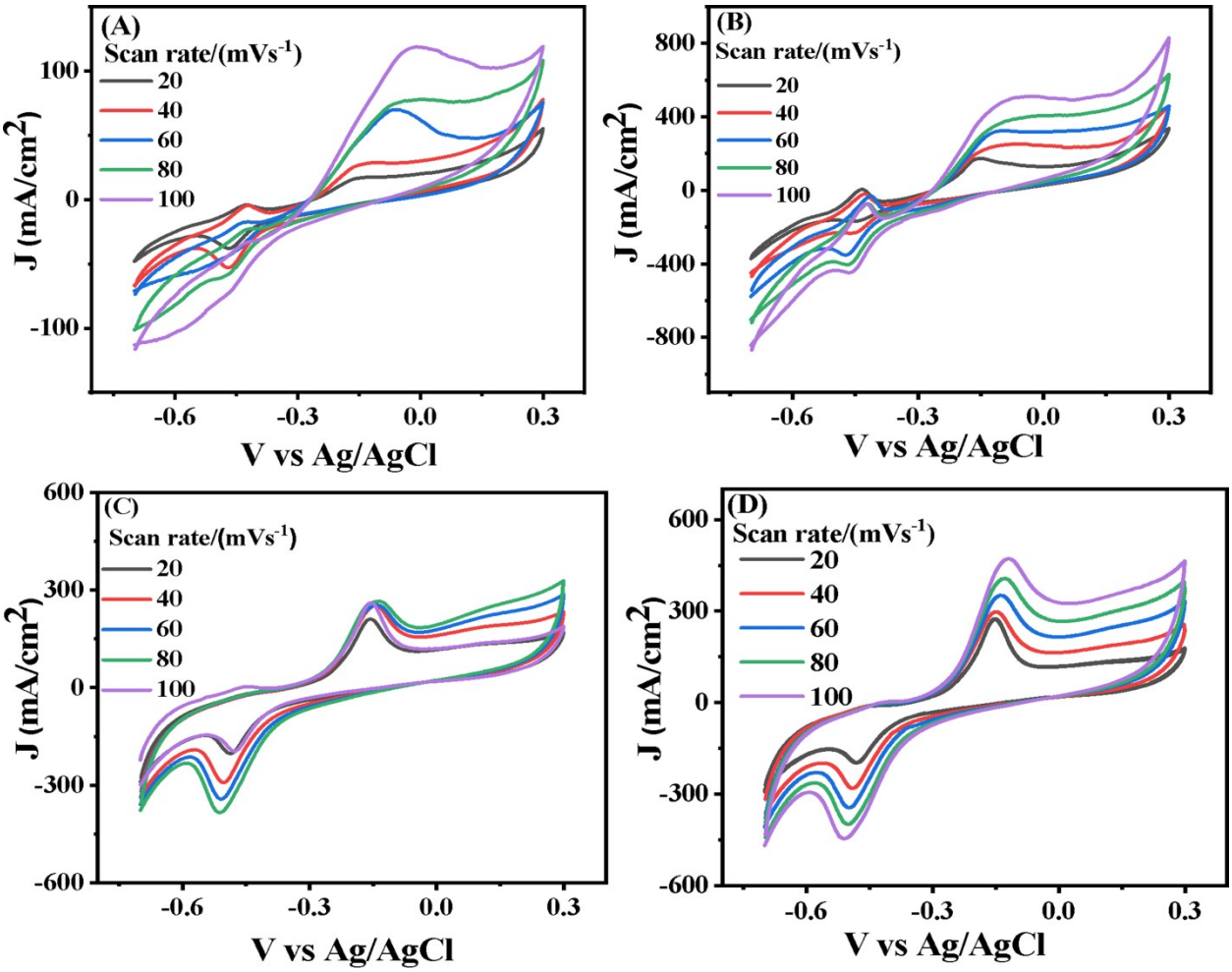


Fig. S5 Cyclic Voltammogram of **(A)** FTO/ TiO_2NRs /$BiVO_4$/Pt with 5 Cycles in Dark **(B)** FTO/ TiO_2NRs /$BiVO_4$/Pt with 5 Cycles in Light **(C)** FTO/ TiO_2NRs /$BiVO_4$/Pt with 15 Cycles in Light **(D)** FTO/ TiO_2NRs /$BiVO_4$/Pt with 15 Cycles in dark

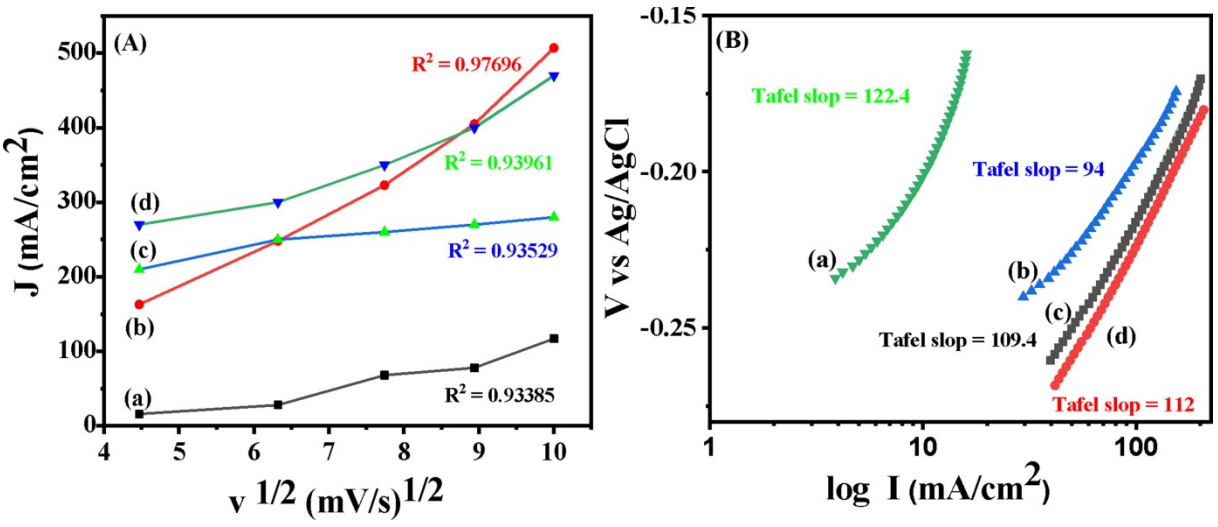


Fig. S6. **(A)** A graphical representation of the direct relationship of peak current density versus under root of scan rate (ν) in 1 M CH_3OH&1M KOH solution and **(B)** Tafel plots in 1M KOH & 1M CH_3OH at 20 mV s−1 scan rate for catalysts of (a)TiO_2/$BiVO_4$/Pt 5 cycles in Dark (b)TiO_2/$BiVO_4$/Pt 5 cycles in Light (c) TiO_2/$BiVO_4$/Pt 15 cycles in Dark (d) TiO_2/$BiVO_4$/Pt 15 cycles in Light