Supporting Information

Insights into morphology and composition effects of one-dimensional CuPt nanostructures on the electrocatalytic activities and methanol oxidation mechanism by in situ FTIR

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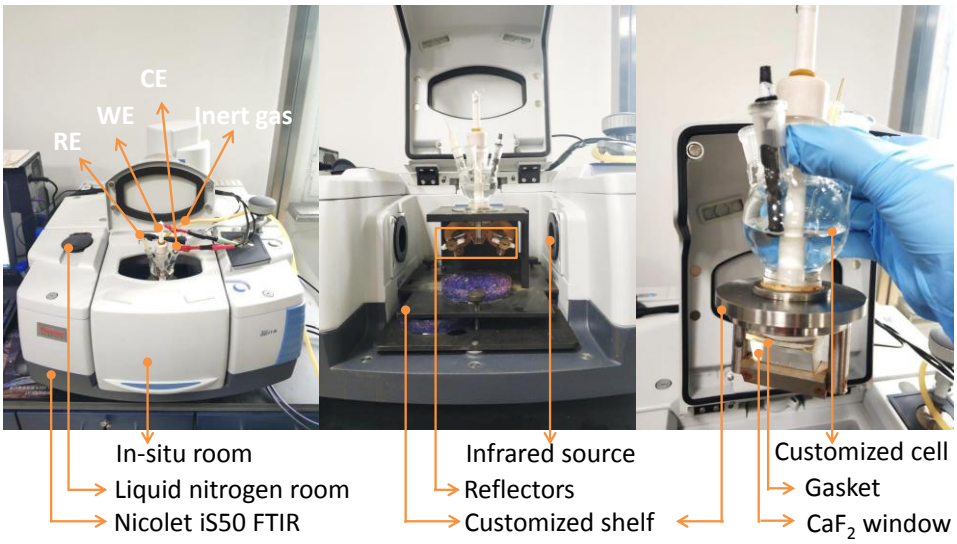

Fig. S1 The instrument and setup for *in situ* electrochemical FTIR measurements.

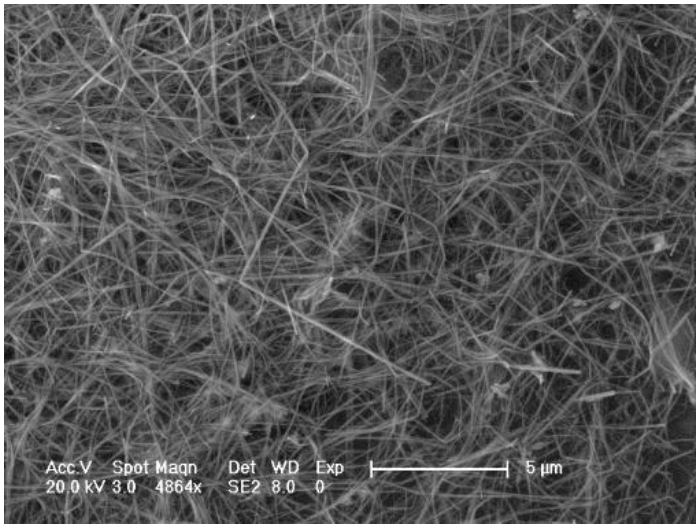

Fig. S2 Large-scale SEM image of the prepared Cu nanowires.

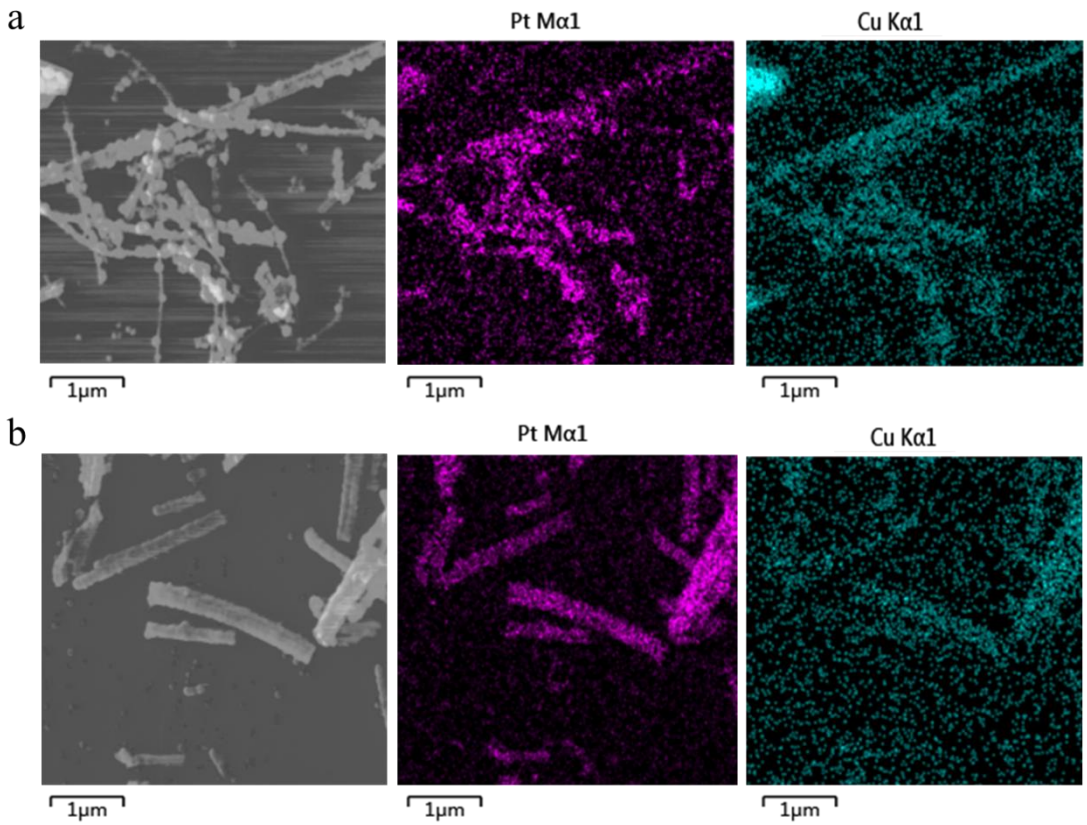

Fig. S3 EDS-mapping the of $CuPt_{1.78}$ NTs (a) and $CuPt_{2.22}$ NWs (b).

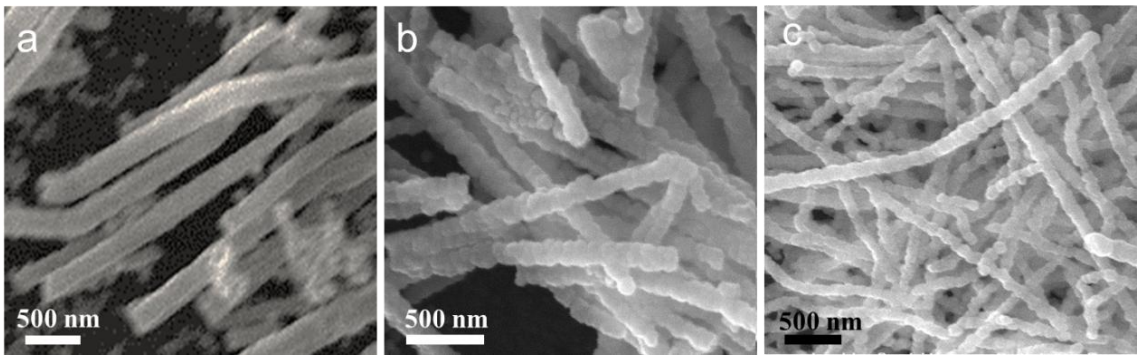

Fig. S4 SEM images of (a) $CuPt_{2.26}$ NWs, (b) $CuPt_{1.33}$ NWs and (c) $CuPt_{0.88}$ NWs

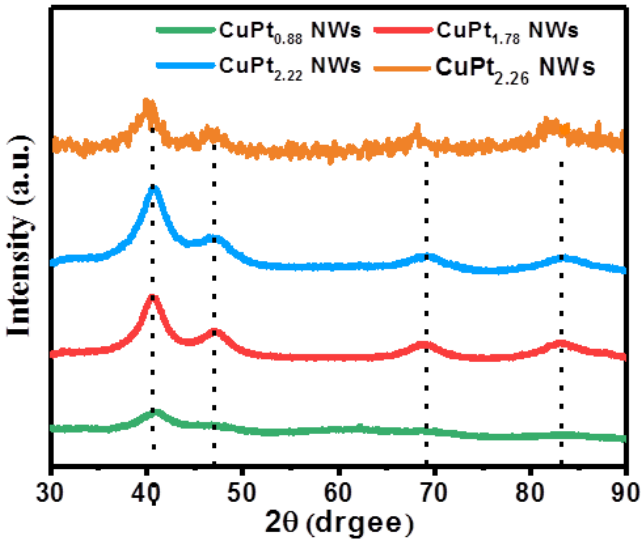

Fig. S5 XRD patterns of the $CuPt_x$ NWs.

For the rotating ring disk electrode (RRDE) test, a RRDE (0.24 cm^2 for geometric surface area) was used as the working electrode, and the mass loading of the catalyst is same with that used for RED tests. The ring potential was held at 1.25 V vs. Ag/AgCl. The electron transfer numbers (n) and the percentage of H_2O_2 yield for ORR on $CuPt_{2.22}$ NWs in O_2-saturated 0.1 M KOH was determined by the following equations:

$$n = \frac{4I_D}{I_D + I_R/N}$$

$$H_2O_2\% = \frac{200I_R/N}{I_D + I_R/N}$$

where I_R is the ring current, I_D is the disk current, and N is the collection efficiency with a value of 0.37.

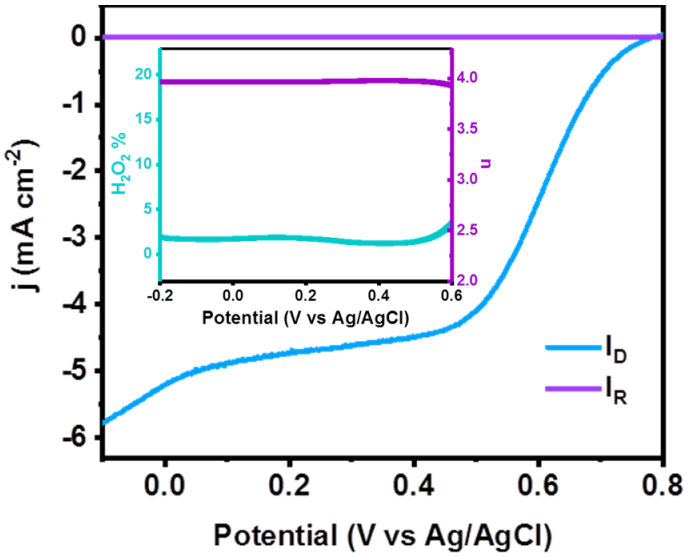

Fig. S6 RRDE LSV for $CuPt_{2.22}$ NWs in O_2-saturated 0.1 M $HClO_4$ at 1600 rpm. Inset is the electron transfer number (n) and the percentage of H_2O_2 yield for ORR.

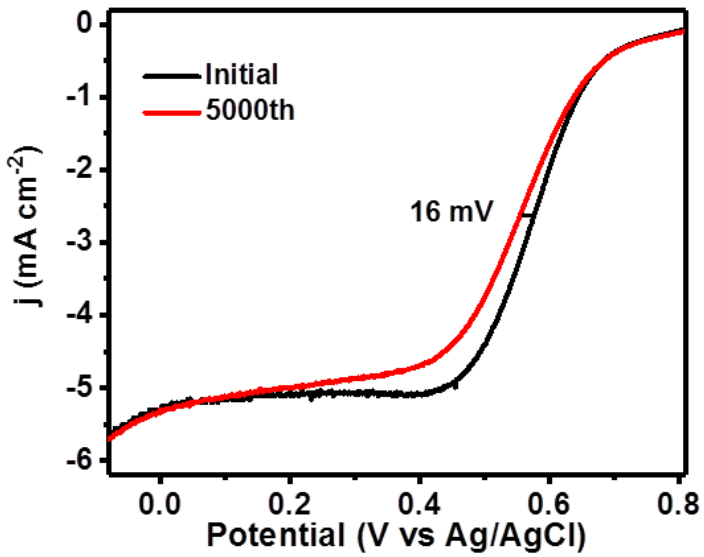

Fig. S7 LSV curves of ORR on the $CuPt_{2.22}$ NWs before and after 5000 potential cycles in 0.1 M $HClO_4$.

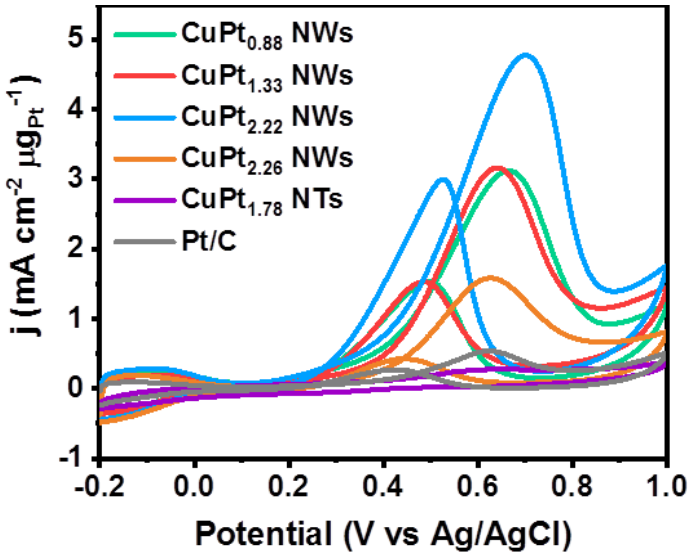

Fig. S8 CV curves of methanol oxidation on different catalysts in 0.1 M $HClO_4$ + 0.5 M CH_3OH with a potential scan rate of 50 mV s^{-1} (current density is normalized by ECSA).

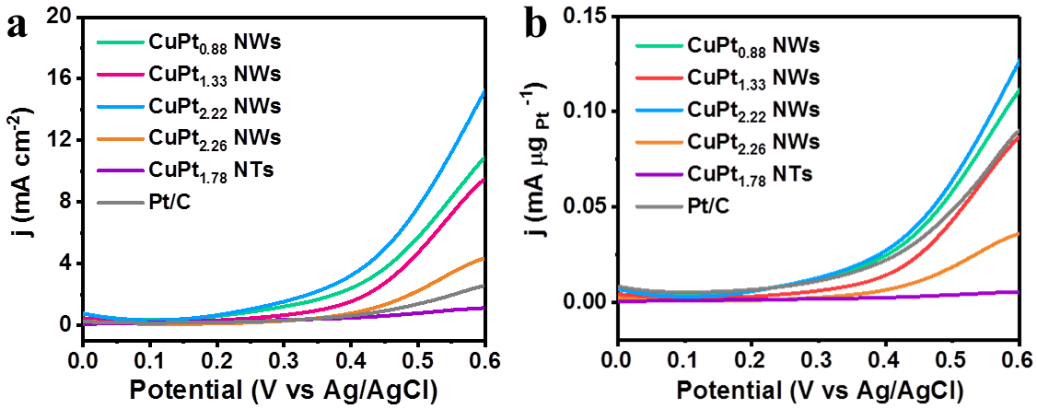

Fig. S9 The amplified CV curves obtained from Fig. 5a, b.

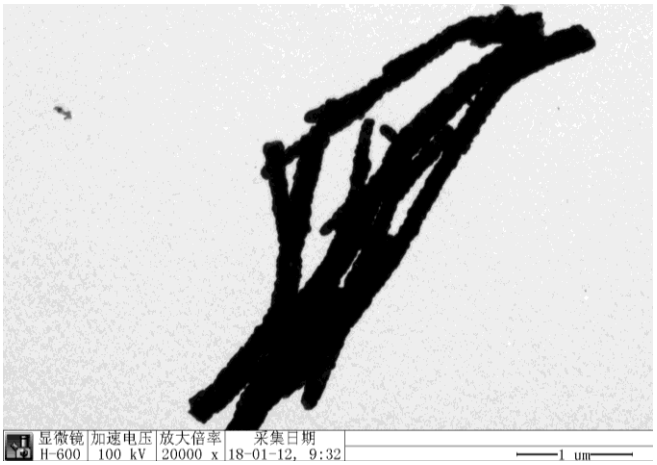

Fig. S10 The representative TEM image of $CuPt_{2.22}$ NWs after durability test.