Electronic Supplementary Material (ESI) for RSC Advances.


# Electronic Supplementary Information

# Cu assisted loading of Pt on $CeO_2$ as carbon-free catalyst for methanol and oxygen reduction reaction

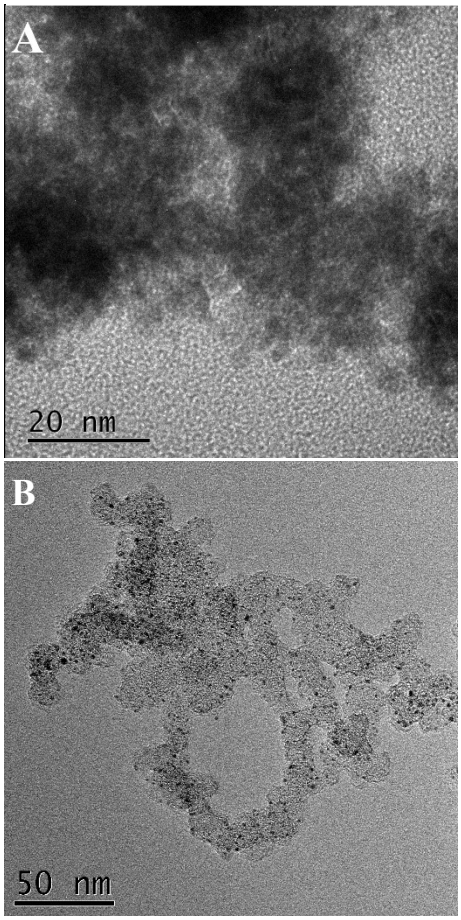


Figure S1 The TEM images of $PtCu/CeO_2$-12 (A) and Pt/C (B). The Pt NPs of Pt/C are highly dispersive on carbon support.

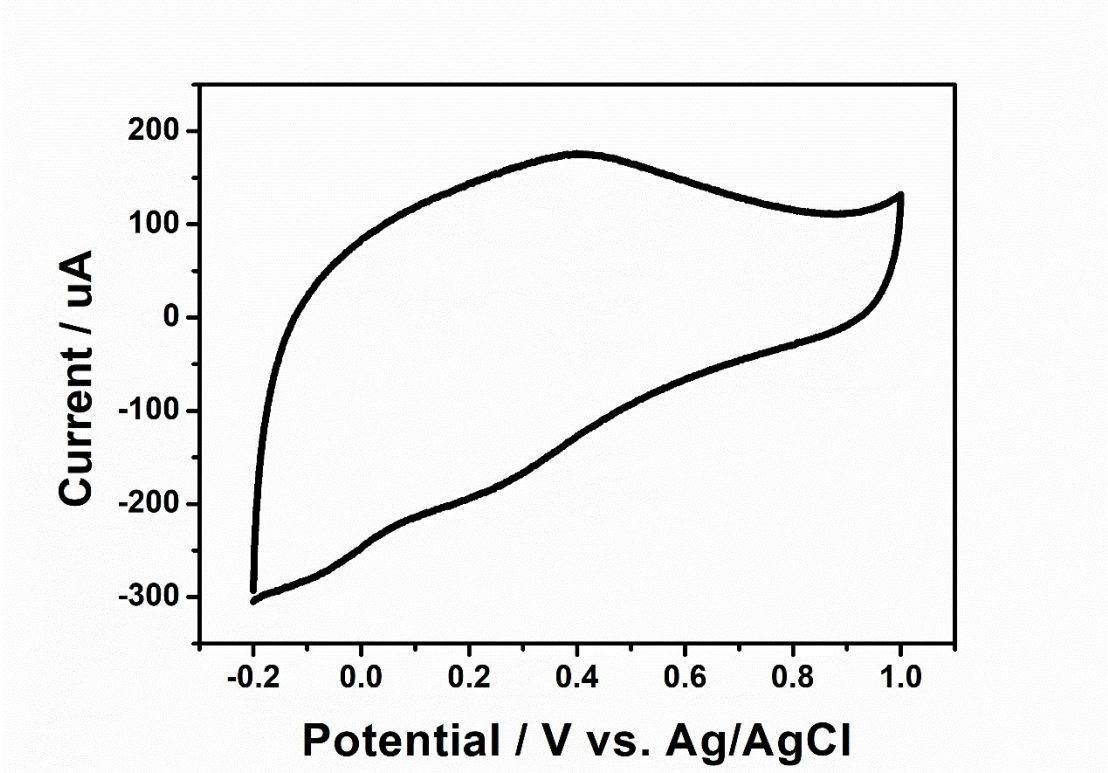


Figure S2 The CV curve of $Pt/CeO_2$.

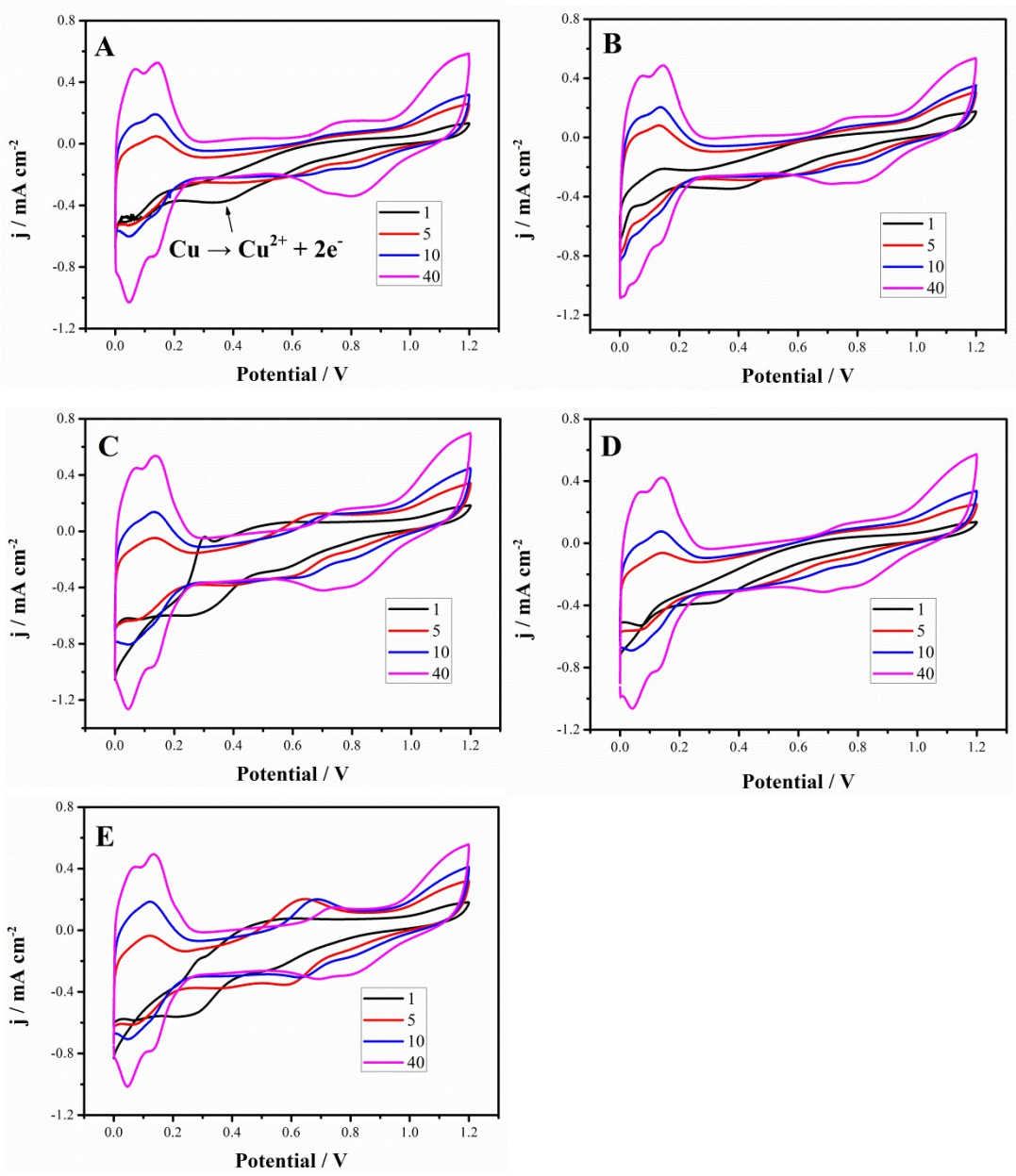


Figure S3 The first (black), fifth (red), tenth (blue), and fortieth (magenta) of Pt loading on Cu-$CeO_2$-31(A), Cu-$CeO_2$-21 (B), Cu-$CeO_2$-11 (C), Cu-$CeO_2$ -12 (D), and Cu-$CeO_2$ -13 (E) in 0.5 M $H_2SO_4$ and $3.86\times10^{-3}$ M $H_2PtCl_6$, the scanning rate was 50 mV $s^{-1}$.

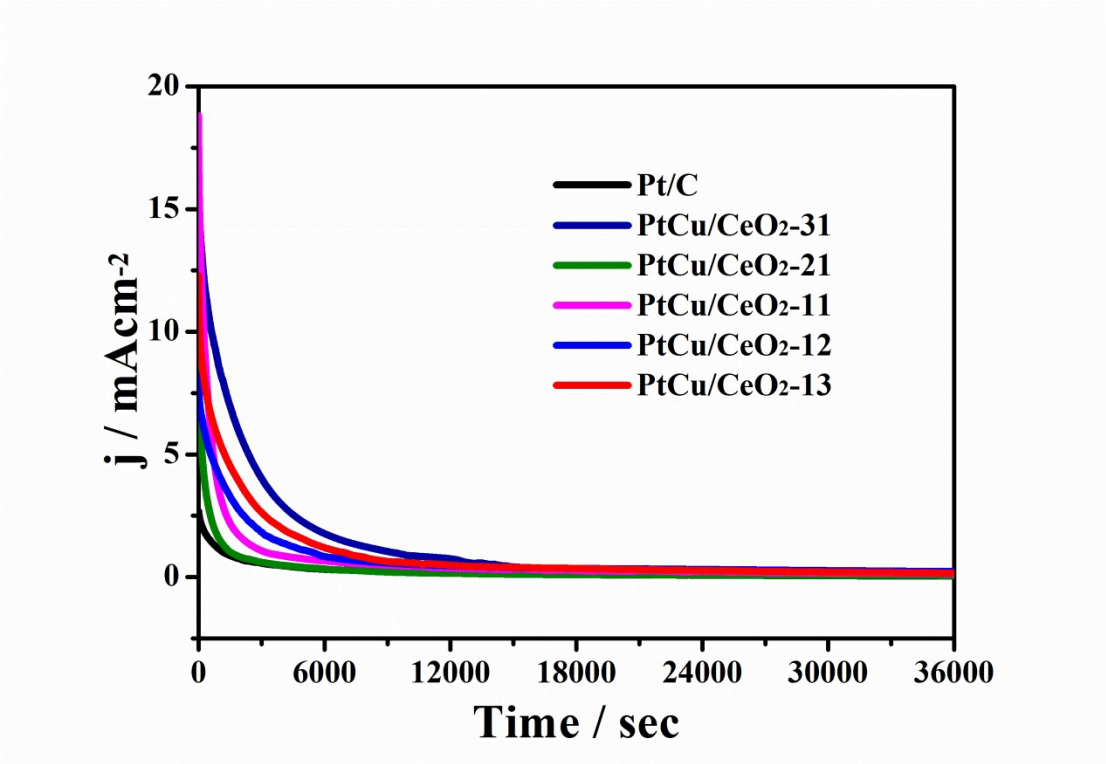


Figure S4 The chronoamperometry running for 36000 s at the constant potential of 0.6 V in 0.5 M $H_2SO_4$ and 1 M $CH_3OH$. After 10 continuous running, the current densities of Pt/C and Pt/Cu-$CeO_2$ catalysts were very close to zero, showing that all catalysts were deactivated almost to death by poisoning species such as $CO_{ads}$.

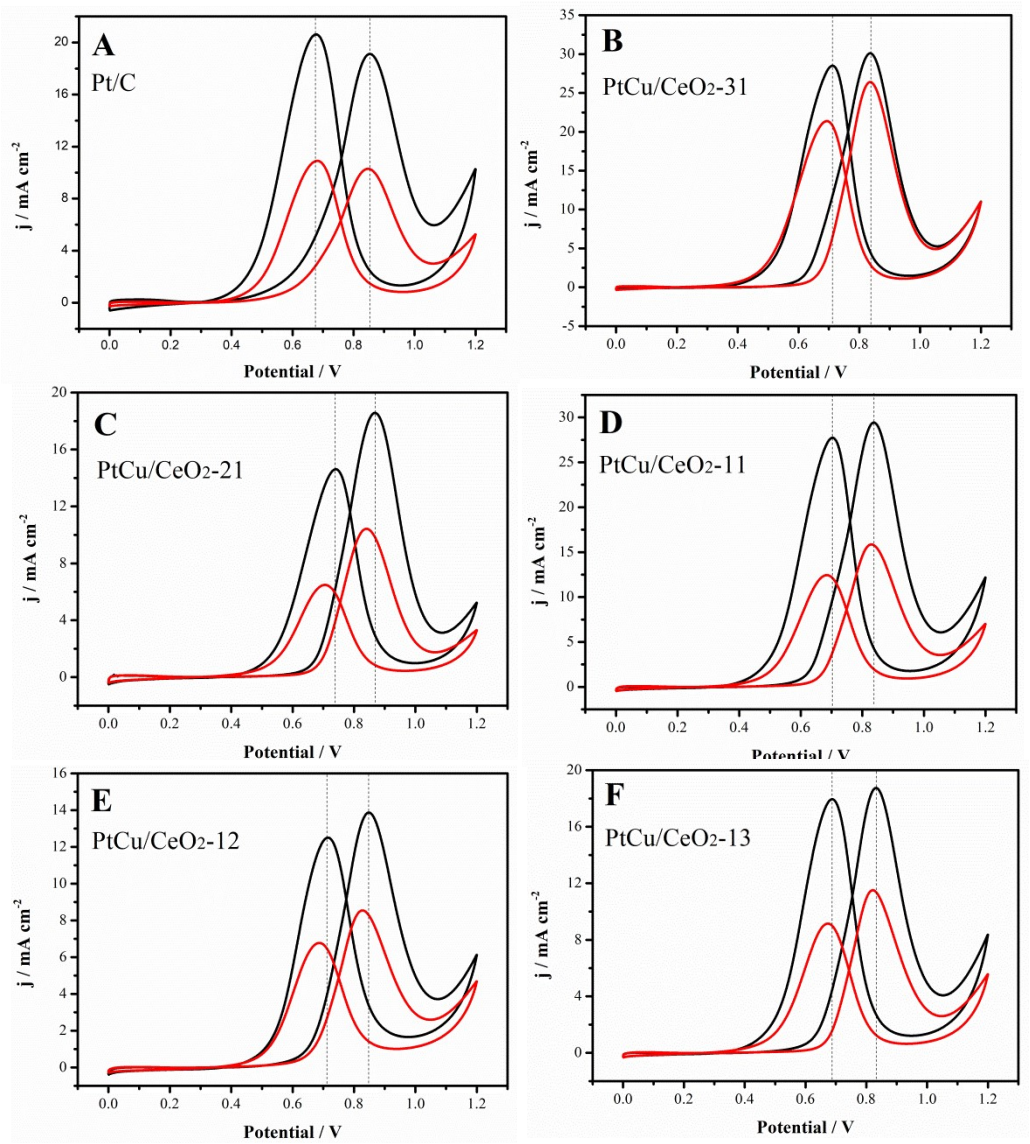


Figure S5 The methanol oxidation before (black) and after (red) chronoamperometry experiments in 1M $CH_3OH$ and 0.5 M $H_2SO_4$. The scanning rate was 50 mV $s^{-1}$. The red curves were obtained right after 10 h continuous chronoamperometry running, therefore, they reflects the inherent MOR activity of catalysts.

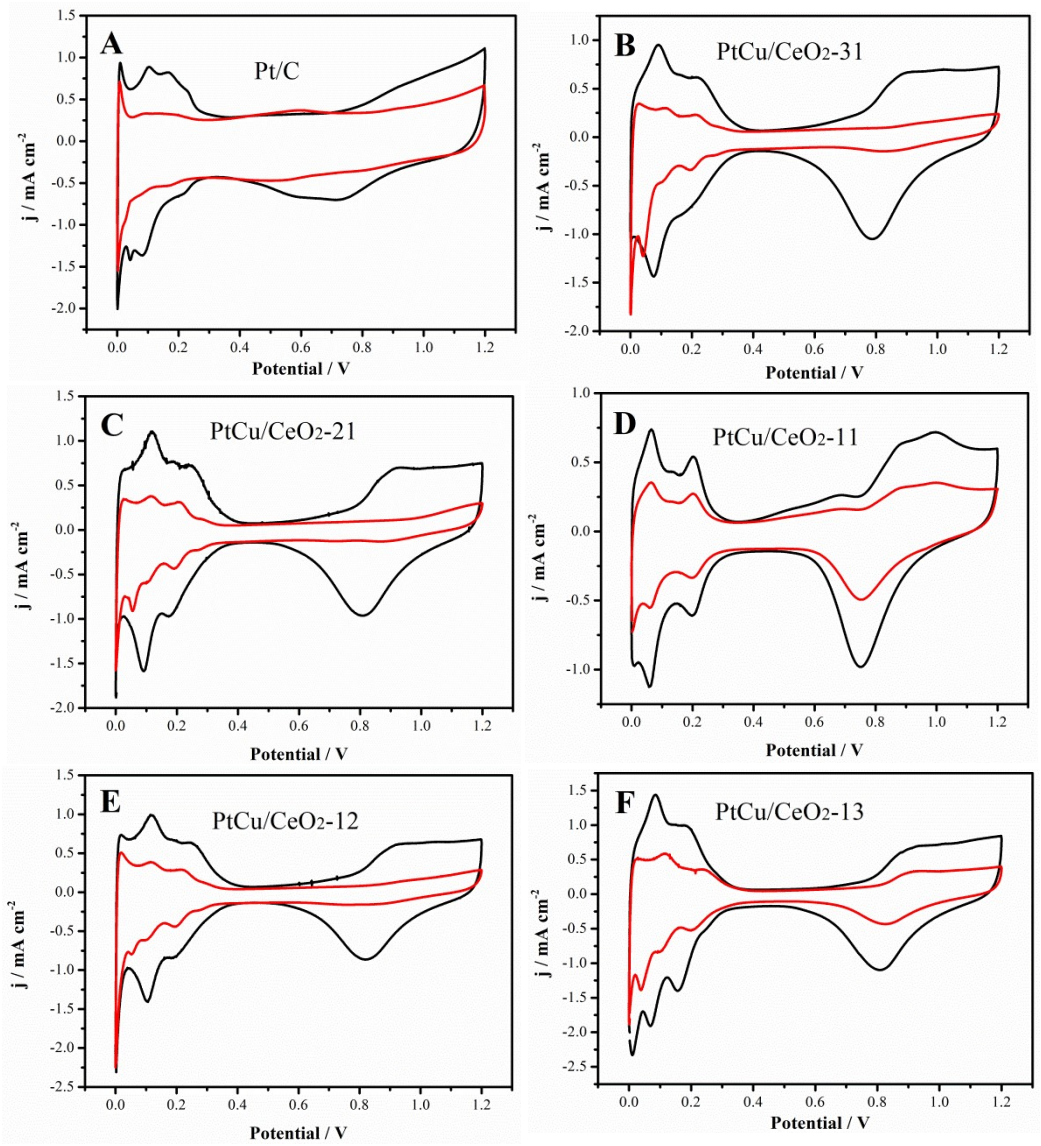


Figure S6 The CVs before (black) and after (red) ADT in 0.5 M $H_2SO_4$. The scanning rate was 50 mV $s^{-1}$.