Supporting Information

Contribution of Polytetrafluoroethylene to Atmosphere-Dependent Synthesis of Cu-based Nanomaterials through Ion-Dipole Interactions

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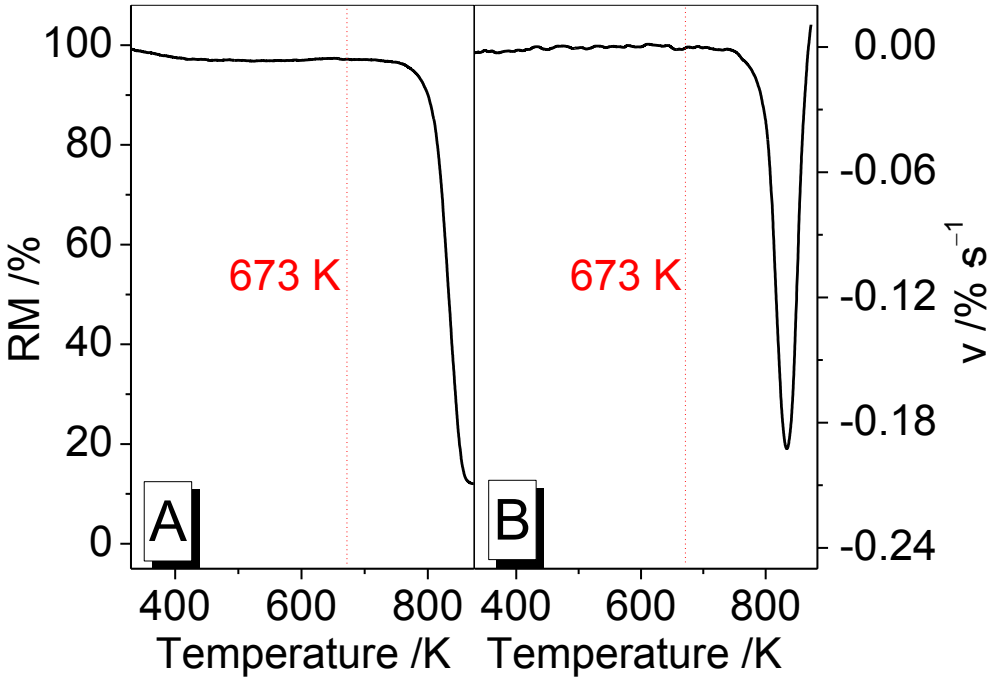

Fig. S1 TG (A) and DTG (B) profiles of PTFE in nitrogen.

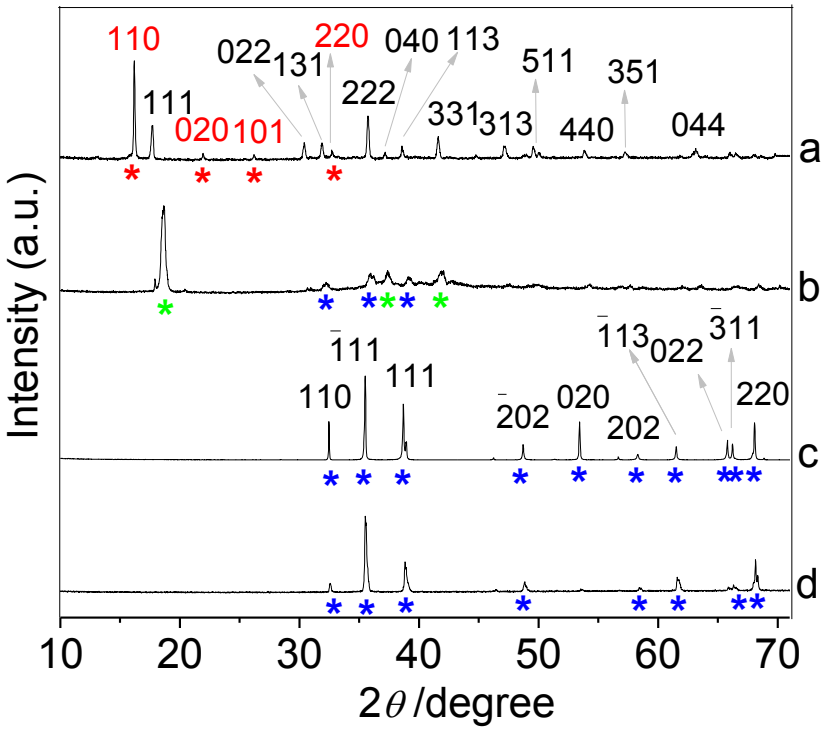

Fig. S2 XRD patterns of $CuCl_2$@Cu_2OCl_2 (a), the mixture of CuO and PTFE (b), CuO (c) and CuO (d) obtained by sintering the $CuCl_2$ at 673 K, PTFE/$CuCl_2$ at 673 K, $CuCl_2$ at 873 K and PTFE/$CuCl_2$ at 873 K in air, respectively. Diffraction peaks due to $CuCl_2$, CuO and PTFE were shown by red, blue and green asterisks, respectively.

The decomposition process of free $CuCl_2$ can be described by Equations 1~3:

$$2CuCl_2 + H_2O \xrightarrow{\Delta} Cu_2OCl_2 + 2HCl\uparrow \quad 1)$$

$$Cu_2OCl_2 \xrightarrow{\Delta} 2CuCl + 0.5O_2\uparrow \quad 2)$$

$$2CuCl + O_2 \xrightarrow{\Delta} 2CuO + Cl_2\uparrow \quad 3)$$

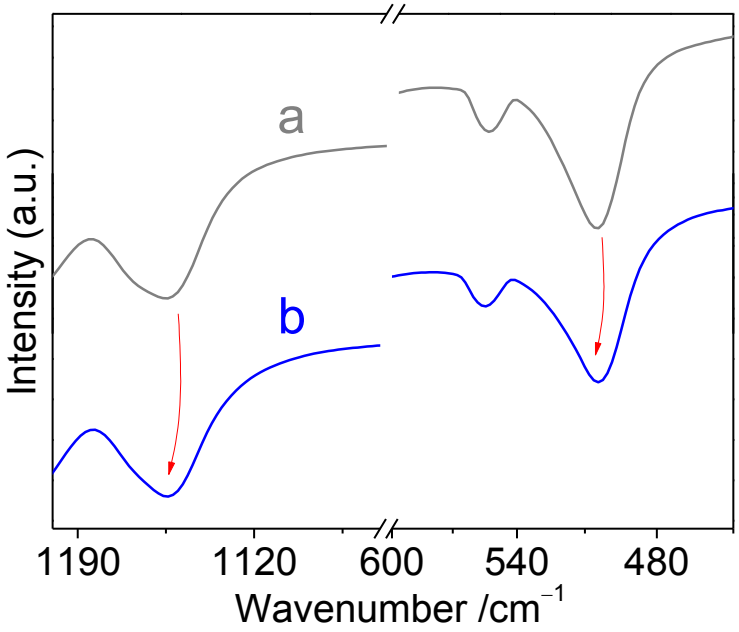

Fig. S3 FTIR spectra of PTFE (a) and PTFE/$CuCl_2$ (b).

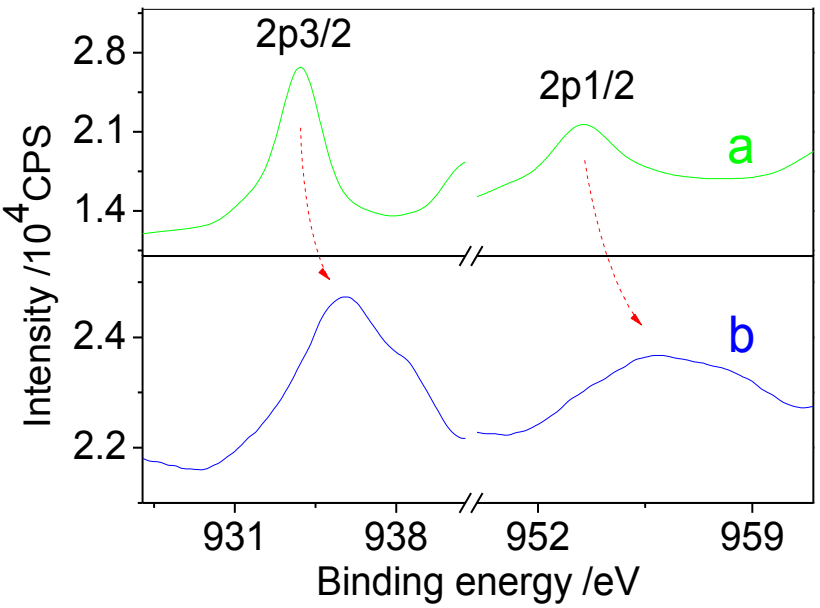

Fig. S4 XPS-(Cu_{2p}) spectra of $CuCl_2$ (a) and PTFE/$CuCl_2$ (b).

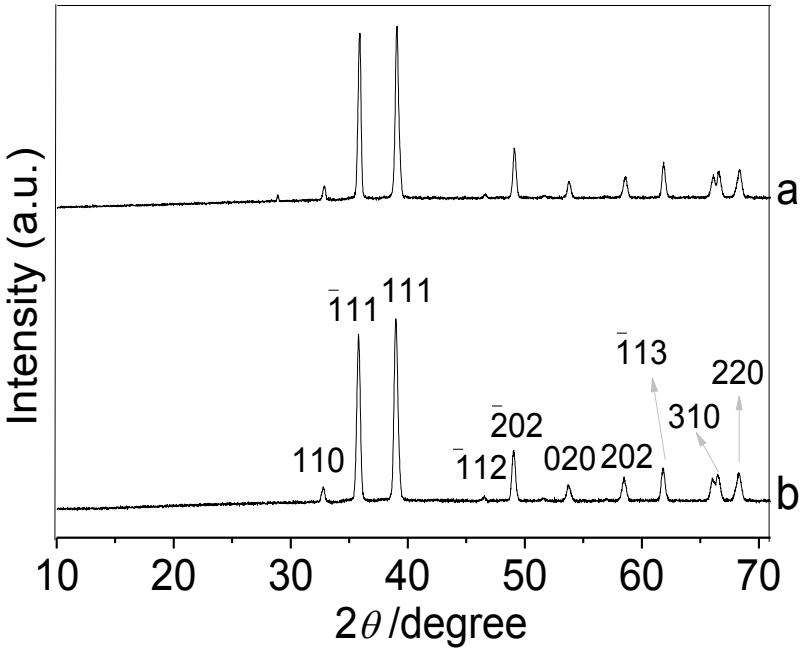

Fig. S5 XRD patterns of CuO (a) and CuO (b) obtained by sintering the PVC/CUC at 673 and 873 K for 2 h in air, respectively.

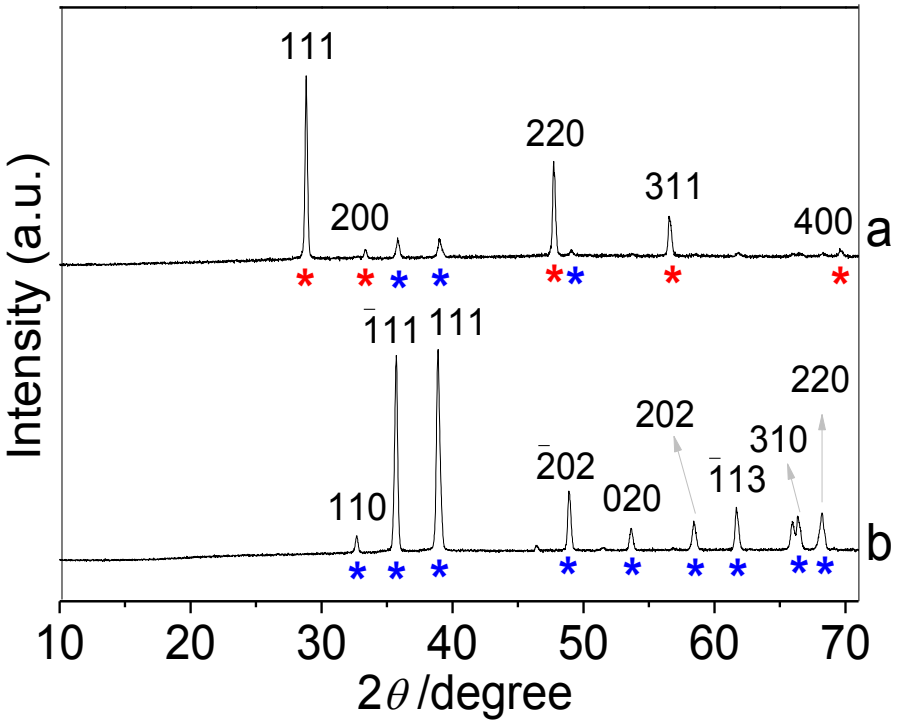

Fig. S6 XRD patterns of CuCl@CuO (a) and CuO (b) obtained by sintering the β-CD/CUC at 673 and 873 K for 2 h in air. Diffraction peaks due to CuCl and CuO were shown by red and blue asterisks, respectively.

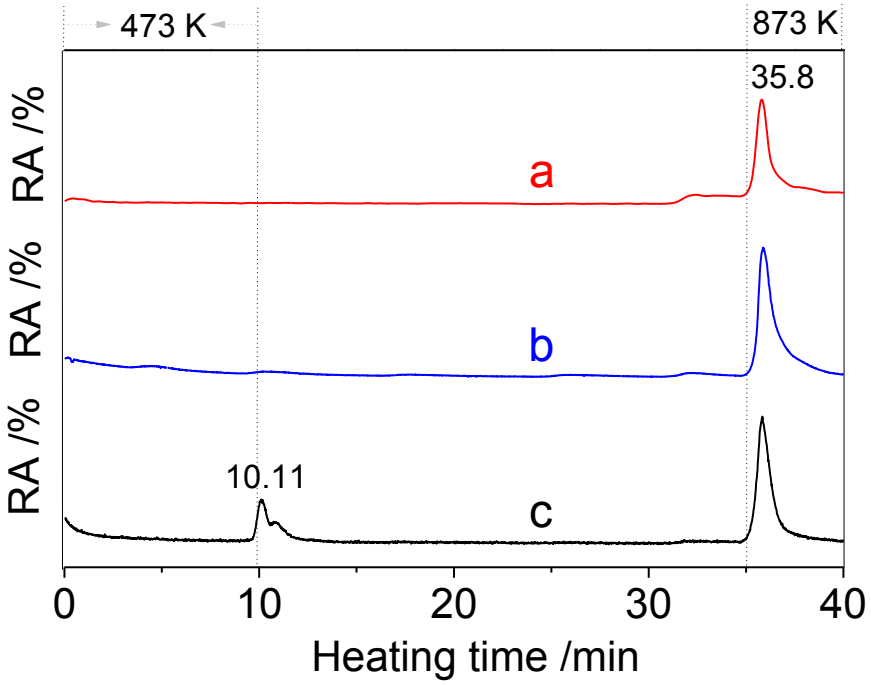

Fig. S7 TIC curves of PTFE (a), PTFE/$CuCl_2$ (b) and PTFE/CUC (c).

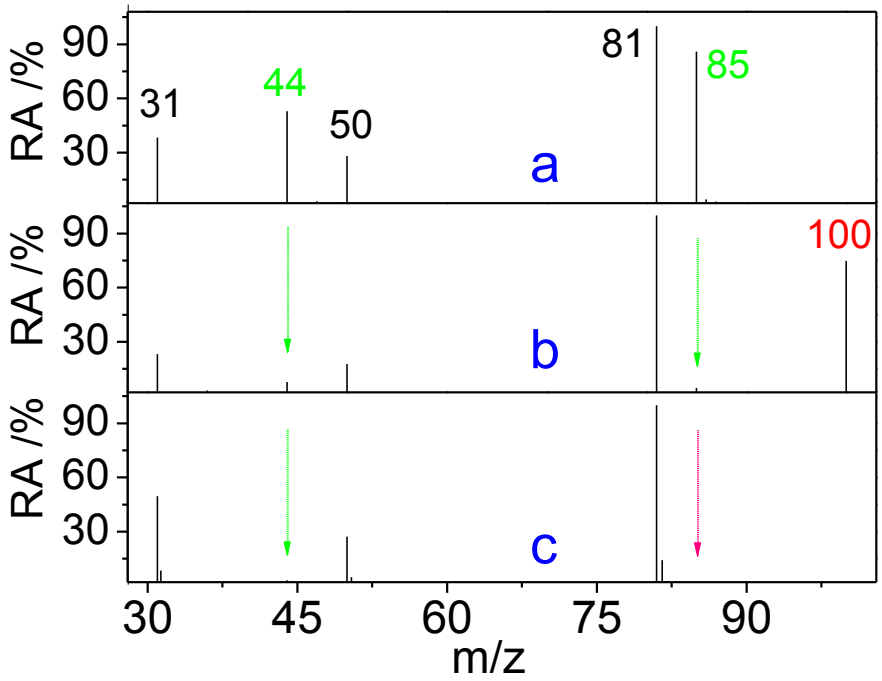

Fig. S8 Mass spectra of PTFE (a), PTFE/$CuCl_2$ (b) and PTFE/CUC (c) at 35.8 min.

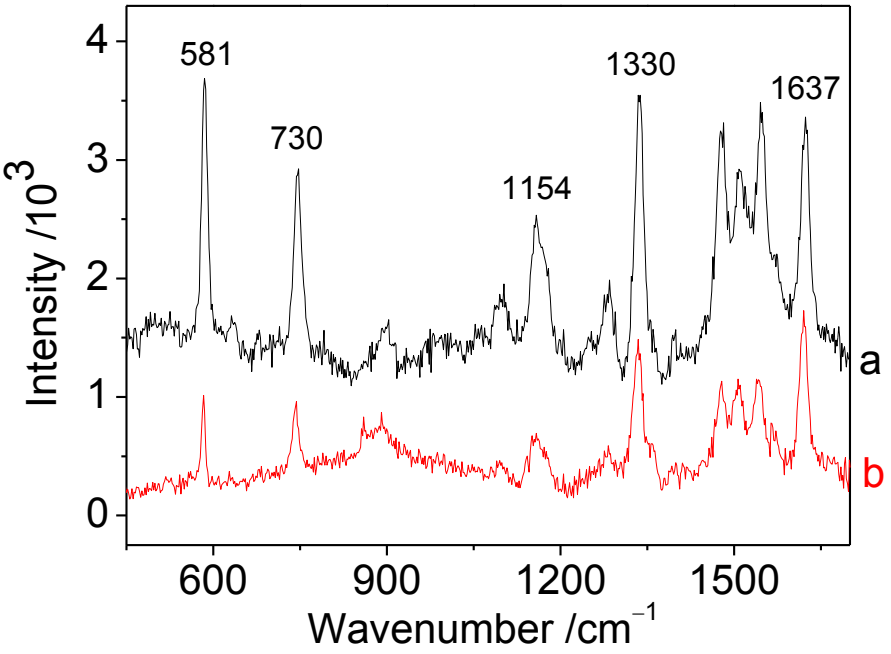

Fig. S9 SERS spectra of R6G on the mixture of commercial Cu and commercial CuCl (a), the commercial Cu (b). Experimental conditions are as follows: λex = 514.5 nm, power = 2.5 mW, integration time = 10 s.