Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.
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SI. The method to calculate the mass of CuO@MnO_2:

$\mathbf{M_1}$ (CuO) = [m (CuO/Cu) - m (Cu)]·80/16

$\mathbf{M_2}$ (MnO_2) = m (CuO@MnO_2/Cu) - m (CuO/Cu)

$\mathbf{M}$ (CuO@MnO_2) = $\mathbf{M_1}$ + $\mathbf{M_2}$

Where m (CuO/Cu) is the total mass of CuO/Cu composites, m (Cu) is the mass of pure Cu, m (CuO@MnO_2/Cu) is the all mass of CuO@MnO_2/Cu composites.

As for supercapacitors, the charge balance will follow the relationship $q_+ = q_-$, where the charge stored by each electrode depends on the specific capacitance (C), the potential range for the charge/discharge process (ΔE), and the mass of the electrode (m) following Equation (1): [1]

$$q = C \times \Delta E \times m \quad (1)$$

and in order to achieve $q_+ = q_-$, the mass balancing will be expressed as follows: [1]

$$\frac{m_+}{m_-} = \frac{C_- \times \Delta E_-}{C_+ \times \Delta E_+} \quad (2)$$

Based on the specific capacitance values and potential ranges found for the CuO@MnO_2 composite and active graphenes (AG), the optimal mass ratio between the two electrodes should be m (CuO@MnO_2)/m (active graphenes) = 0.75 in the asymmetric supercapacitor (Fig. S1). It is hard to control the accurate mass of the AG when we mixing and pressing powder of AG with ancillary materials such as carbon black or binder onto the Cu grid. Therefore, the mass loading of CuO@MnO_2 and AG on Cu grid have a weight of 4.5 and 5.5 mg, respectively, which indicates a mass ratio of 0.81 in our work.

Fig. S1 Electrochemical tests of the active graphenes (AG) in a three-electrode configuration: (a) cyclic voltammograms; (b) charge/discharge curves.

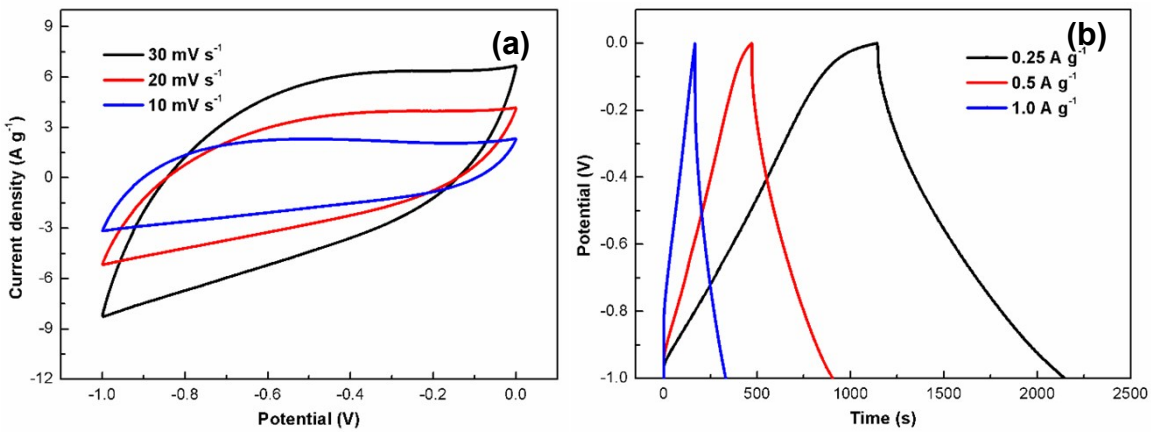


Fig. S2 The optical photograph of original copper grid (a) and the corresponding SEM image of original copper grid (b); The SEM images of CuO@MnO_2 NWs (c, d).

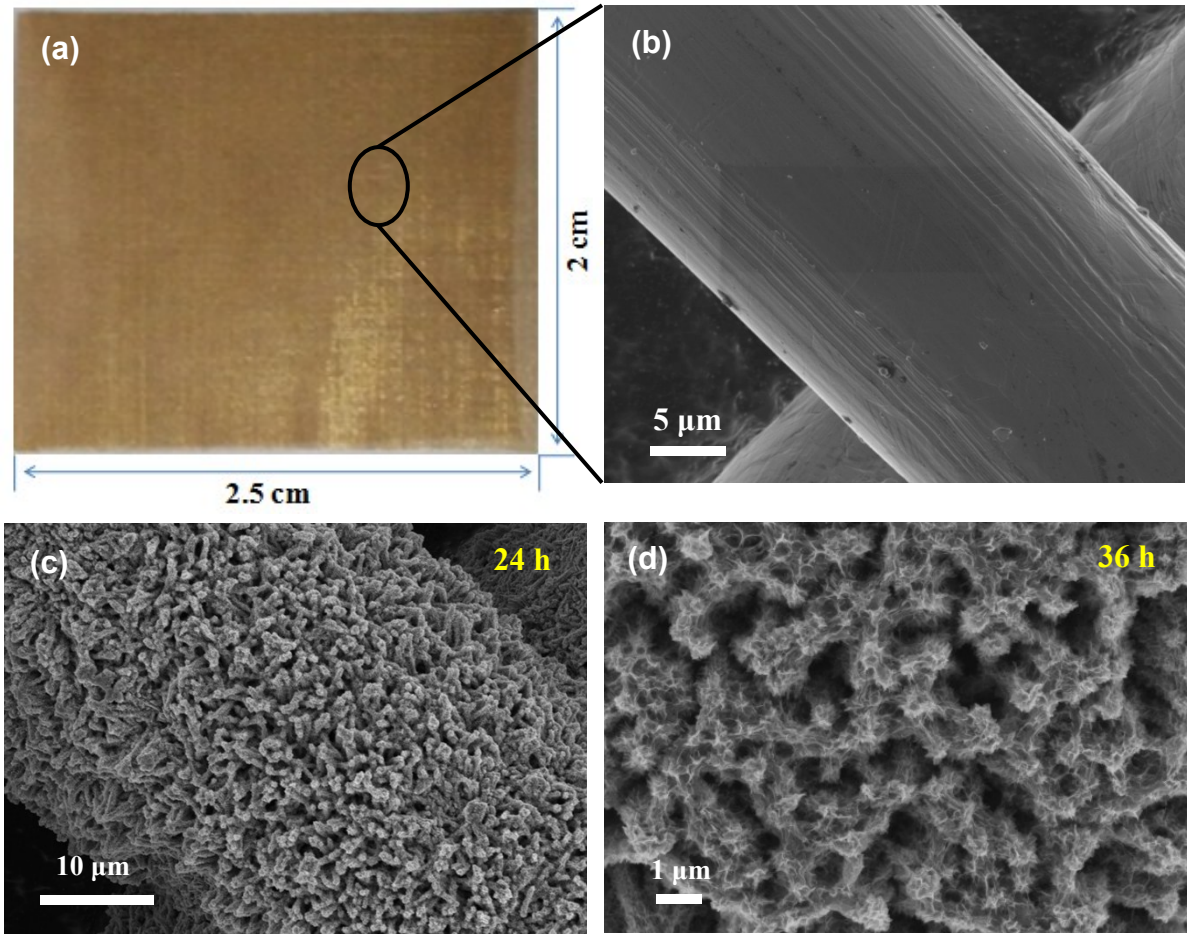


Fig. S3 SEM image (a) and the corresponding EDS mapping of original copper grid.

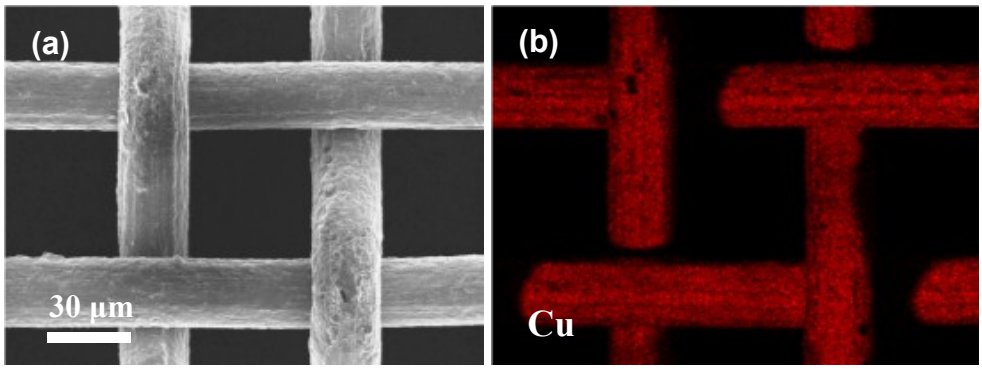


Fig. S4 Energy dispersive spectroscopy (EDS) analysis of the CuO@MnO_2 (24 h) on Cu grid.

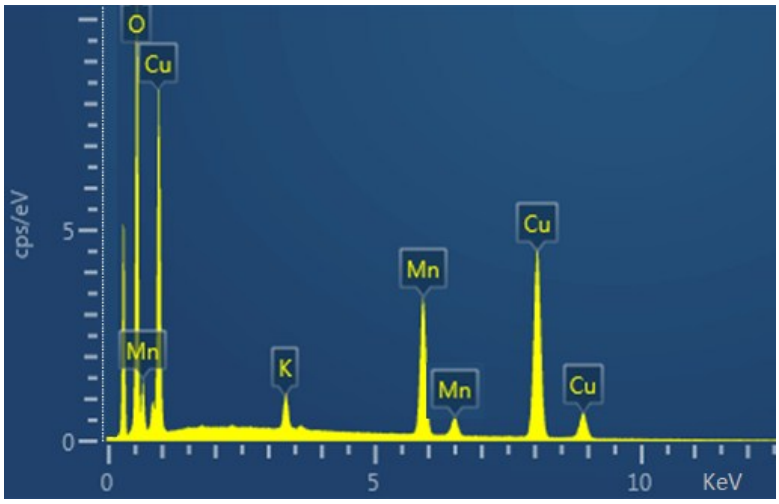


Fig. S5 CV curves of $CuO@MnO_2$ (12 h) and $CuO@MnO_2$ (36 h) measured at different scan rates.

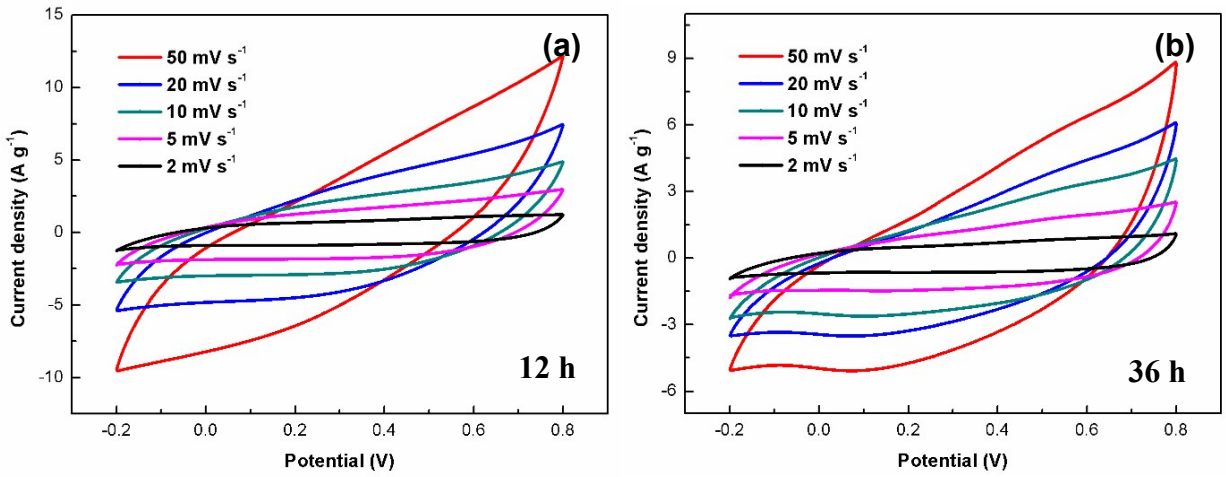


Fig. S6 The electrochemical performance of the two kinds of electrodes: cyclic voltammograms and galvanostatic charge-discharge curves of MnO_2 powder (a, b) and CuO NWs on Cu grid (c, d); Specific capacitance of the three kinds of electrodes measured under different current densities (e); Nyquist plots of the three kinds of electrodes with inset showing the corresponding equivalent circuit (f).

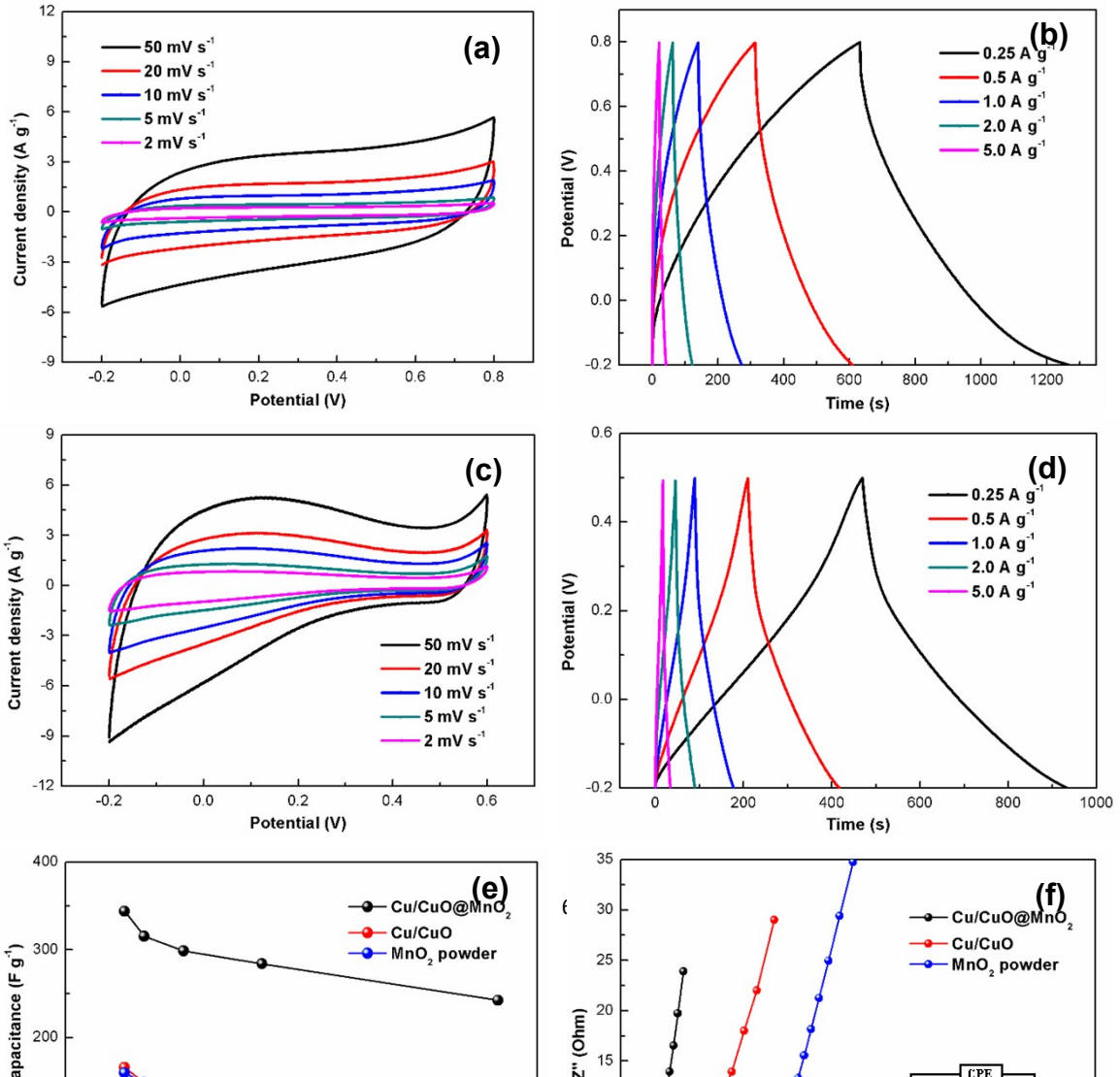


Fig. S7 The SEM images of activated graphenes.

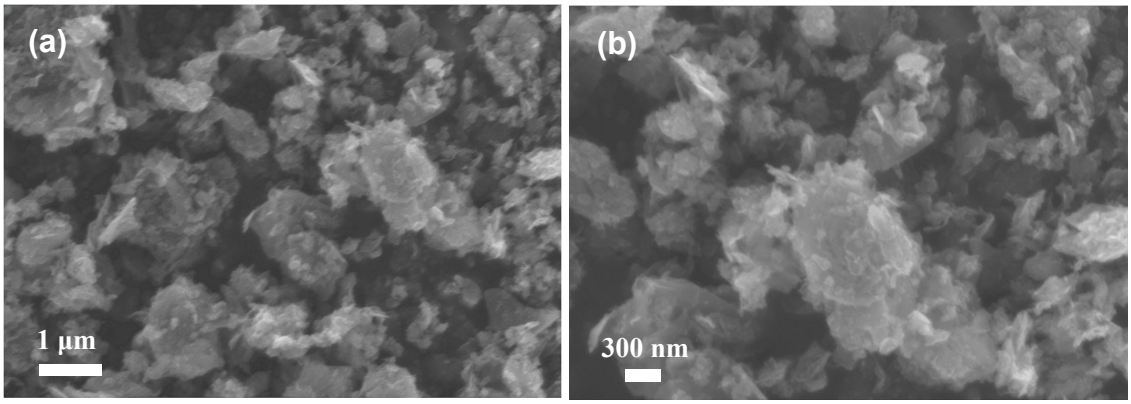
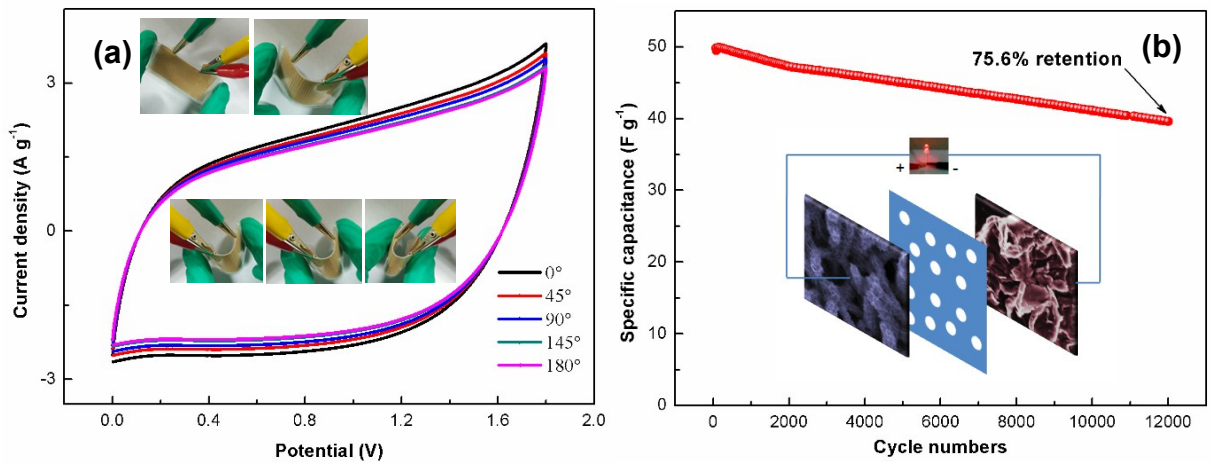


Fig. S8 CV curves obtained from asymmetric supercapacitor with different degree of bending angles at 50 mV s^{-1} (a); Cycling ability of asymmetric supercapacitor at a current of 0.6 A g^{-1} (b).



References

1 Z. Fan, J. Yan, T. Wei, L. Zhi, G. Ning, T. Li and F. Wei, *Adv. Funct. Mater.*, 2011, **21**, 2366-2375.