Transition metal chalcogenides based MnSe hetero structured with $NiCo_2O_4$ as a new high performance electrode material for capacitive energy storage.

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Electrochemical calculations:

Specific capacity (C) or specific capacitance (C_s) were calculated from the GCD curves following the equations $C = I \times \Delta t/m$ (for the MnSe, $NiCo_2O_4$ and MnSe(20)/$NiCo_2O_4$ electrodes) and $C_s = I \times \Delta t/(m \times \Delta V)$ (for the MnSe, $NiCo_2O_4$ and MnSe(20)/$NiCo_2O_4$ electrodes), where I is the discharge current (A), Δt is the discharge time (S), m is the mass of the electroactive material in the electrode (g), and ΔV is the total potential deviation (V). The specific energy and power were calculated for asymmetric device using following equations:

$$E = I \int_{t=0}^{t=t} V(t)dt$$

$$P = \frac{E}{t}$$

Where, E is the specific energy (W h kg^{-1}), P is the specific power (W kg^{-1}), I is the specific current (A g^{-1}), V is the potential (V) and t is discharge time (S).[1]

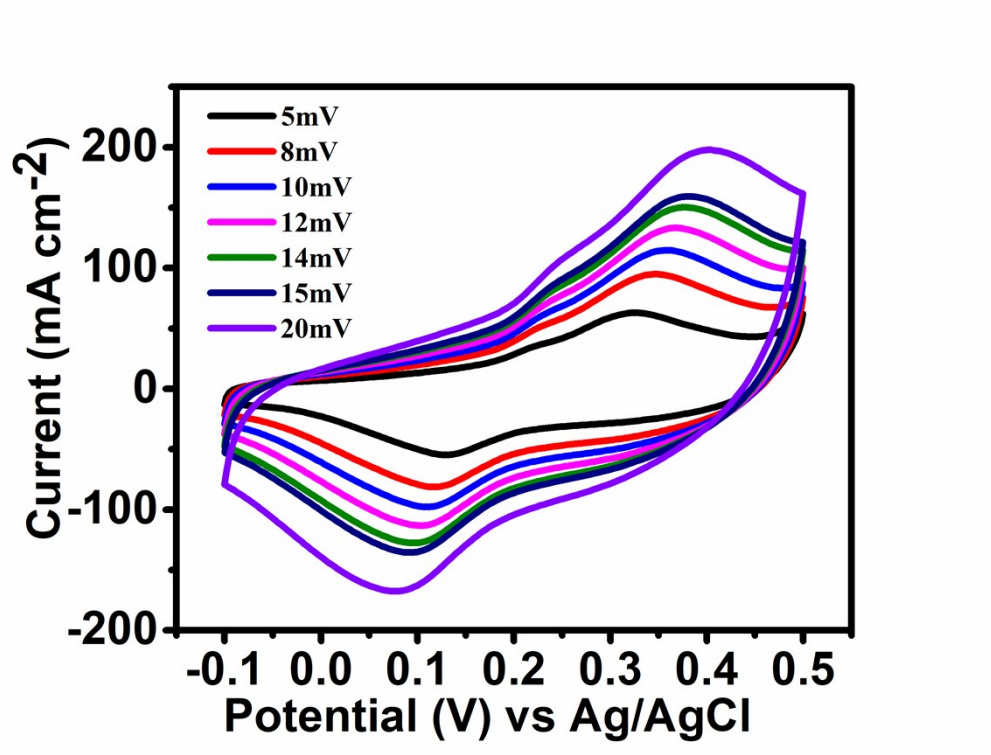

Fig S1. CV curves of MnSe(10)/$NiCo_2O_4$

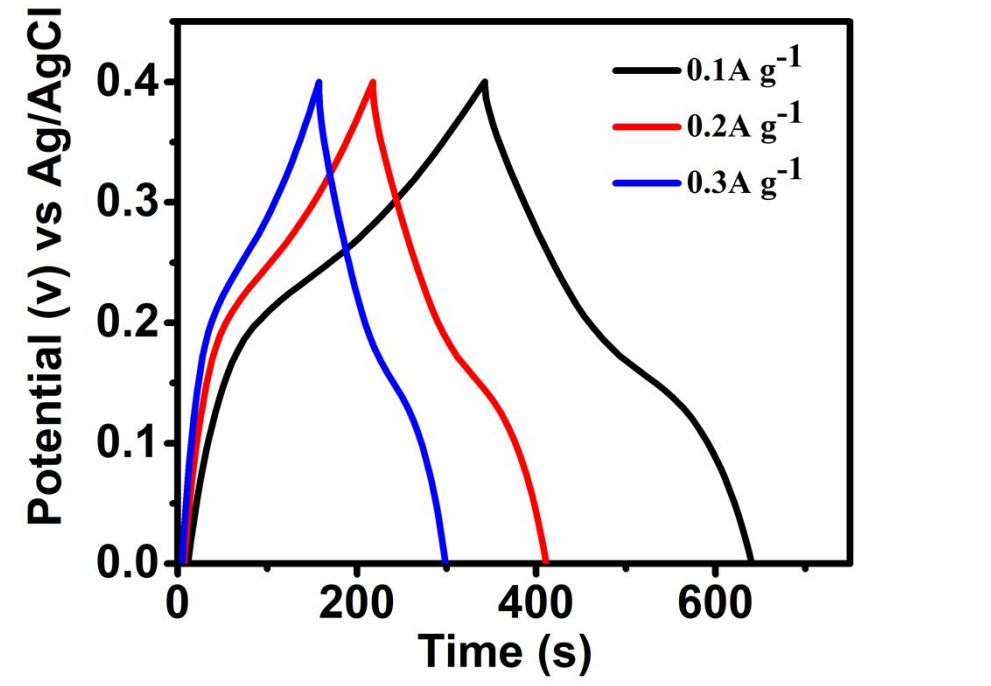

Fig S2. Charge-discharge curve of MnSe(10)/$NiCo_2O_4$.

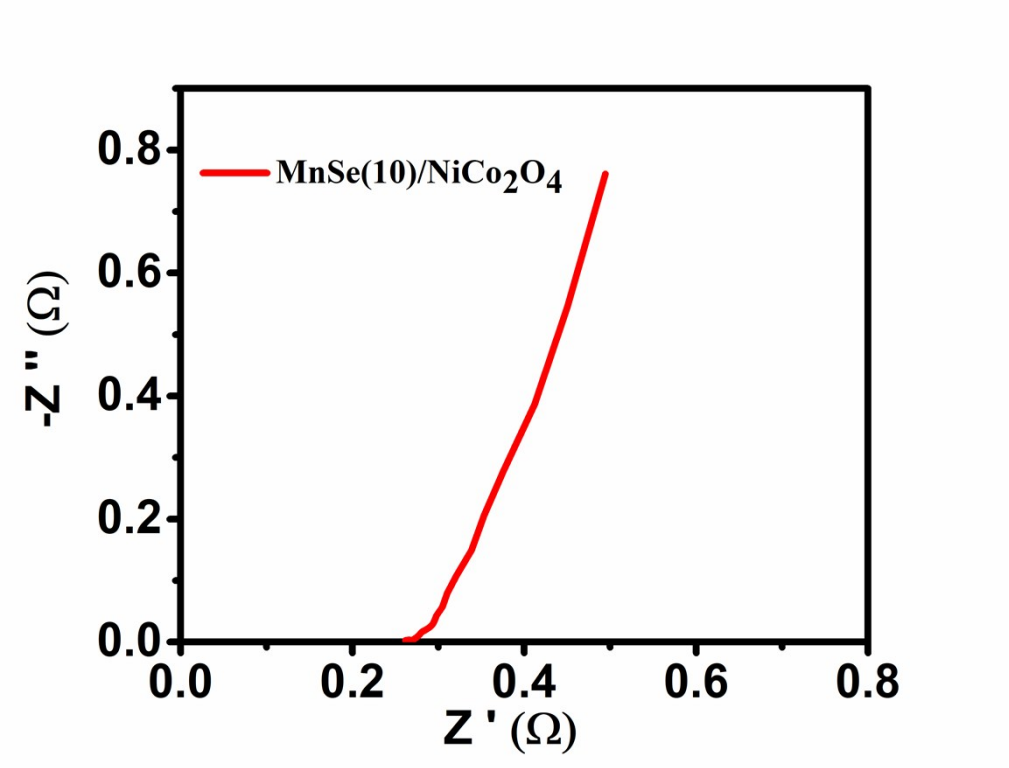

Fig S3. EIS spectra of MnSe(10)/$NiCo_2O_4$

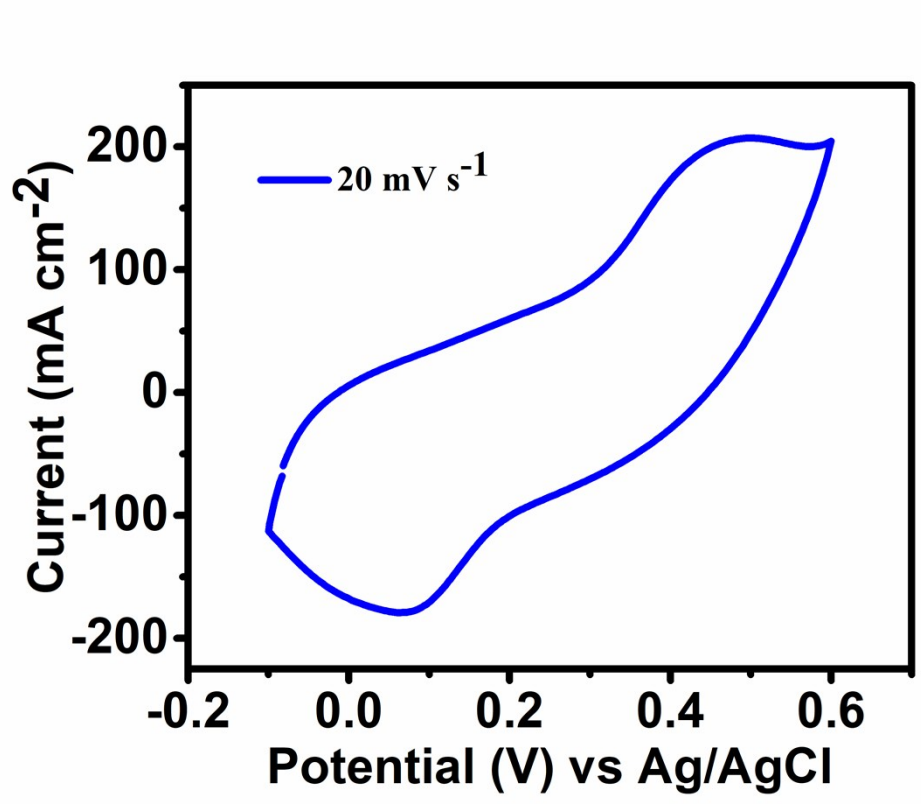

Fig S4. CV curve of MnSe(30)/$NiCo_2O_4$.

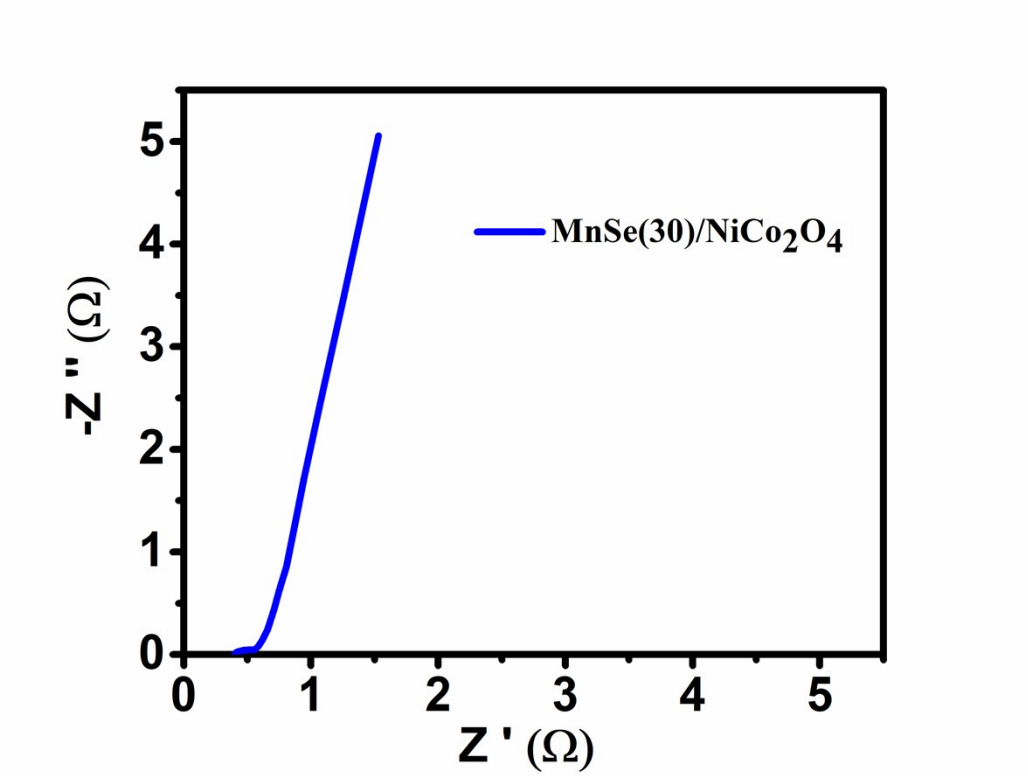

Fig S5. EIS spectra of MnSe(30)/$NiCo_2O_4$

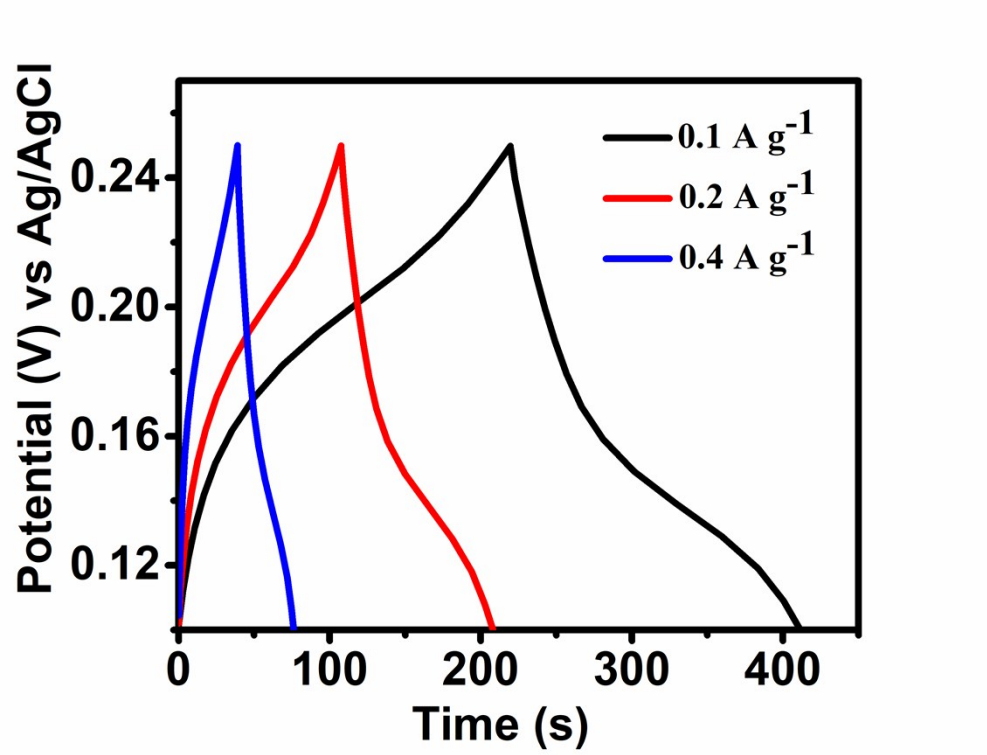

Fig S6. Charge-discharge curve of MnSe(30)/$NiCo_2O_4$

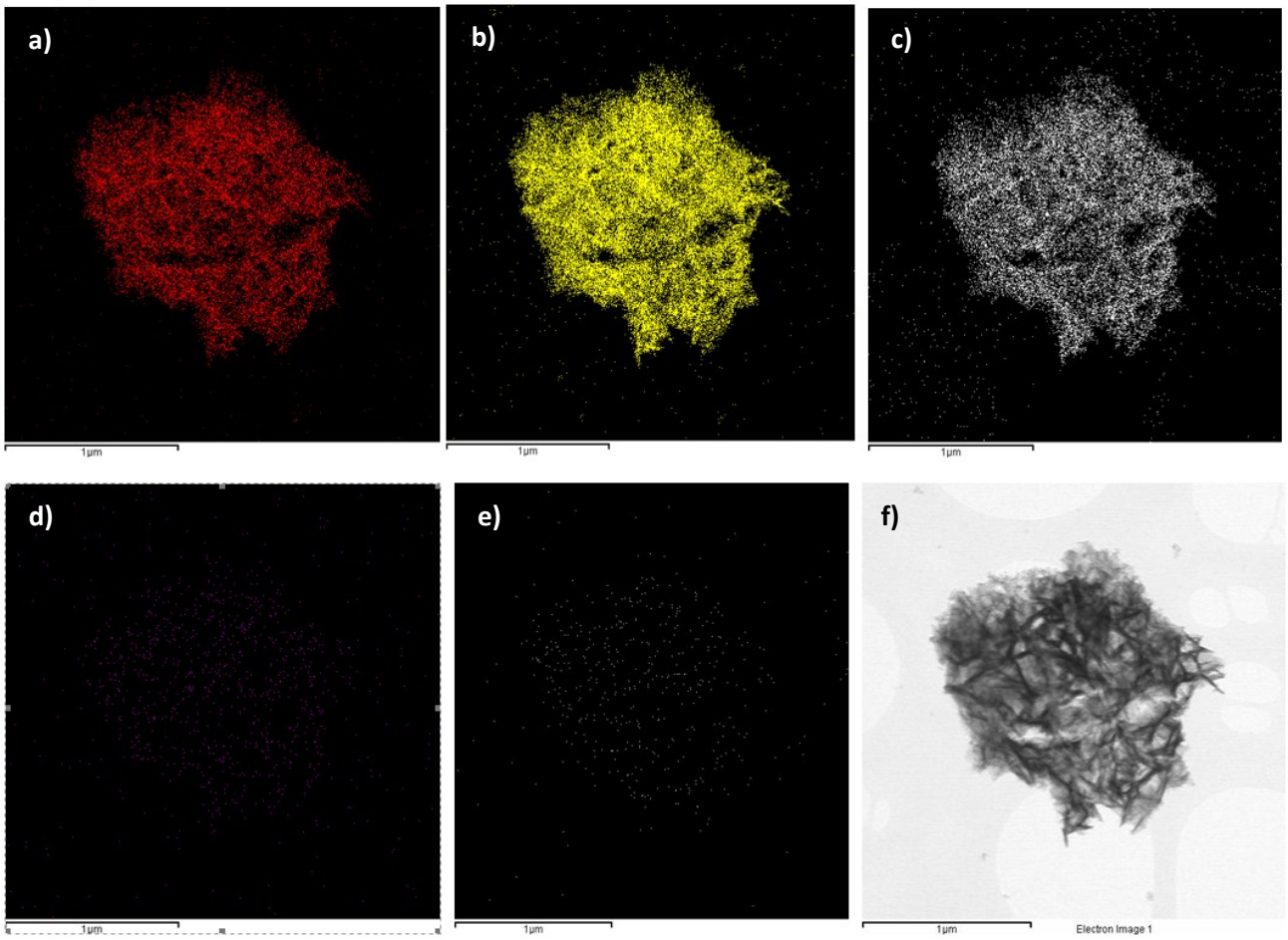

Fig S7. TEM EDS mapping of MnSe(20)/$NiCo_2O_4$

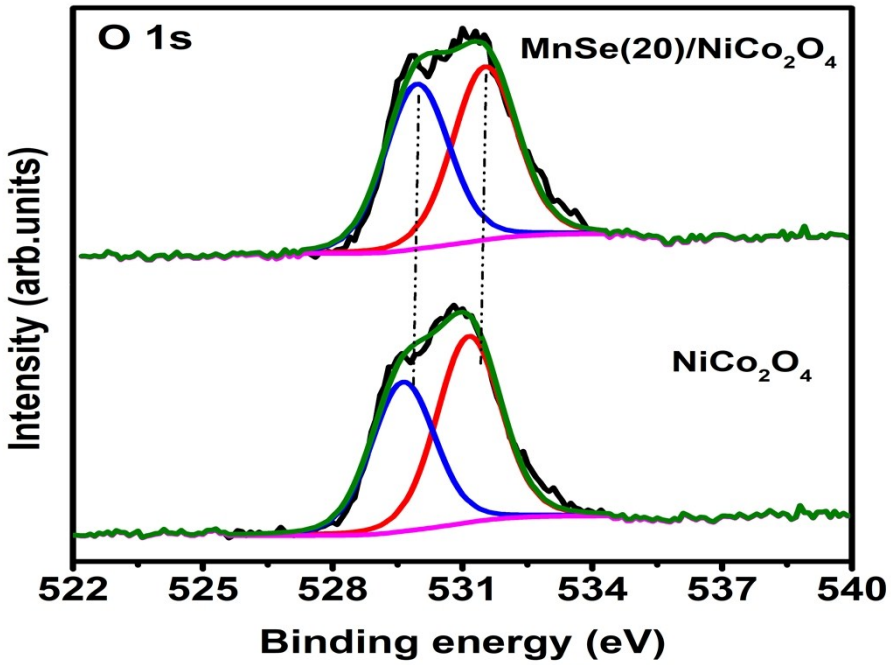

Fig S8. XPS spectra of O.

References

1 J. Ding, H. Wang, Z. Li, K. Cui, D. Karpuzov, X. Tan, A. Kohandehghan and D. Mitlin, *Energy Environ. Sci.*, 2015, **8**, 941–955.