Supporting Information

Fluorane Sensitive Supercapacitive Microcrystalline MoO_3: Dual Application in Energy Storage and HF Detection

Love Bansal[1], Tanushree Ghosh[1], Suchita Kandpal[1], Chanchal Rani[1], Bhumika Sahu[1], Deb Kumar Rath[1], Christoph Wesemann[2,3], Sandeep Chhoker[4], Nadja C. Bigall[2,3*], and Rajesh Kumar [1,5*]

[1]Materials and Device Laboratory, Department of Physics, Indian Institute of Technology Indore, Simrol-453552, India

[2]Institute of Physical Chemistry and Electrochemistry (PCI), Gottfried Wilhelm Leibniz University Hannover, Callinstr. 3a, D-30167 Hannover, Germany

[3] Cluster of Excellence PhoenixD (Photonics, Optics and Engineering – Innovation Across Disciplines), Leibniz University Hannover, D-30167 Hannover, Germany

[4] Department of Physics and Material Science and Engineering, Jaypee Institute of Information Technology, Noida, 201307, India

[5]Centre for advanced electronics, Indian Institute of Technology Indore, Simrol-453552, India

[$]*Current Address: Department of Chemistry, University of Michigan, Ann Arbor, Michigan 48109, United States of America*

*Email: rajeshkumar@iiti.ac.in (RK); nadja.bigall@pci.uni-hannover.de (NCB)

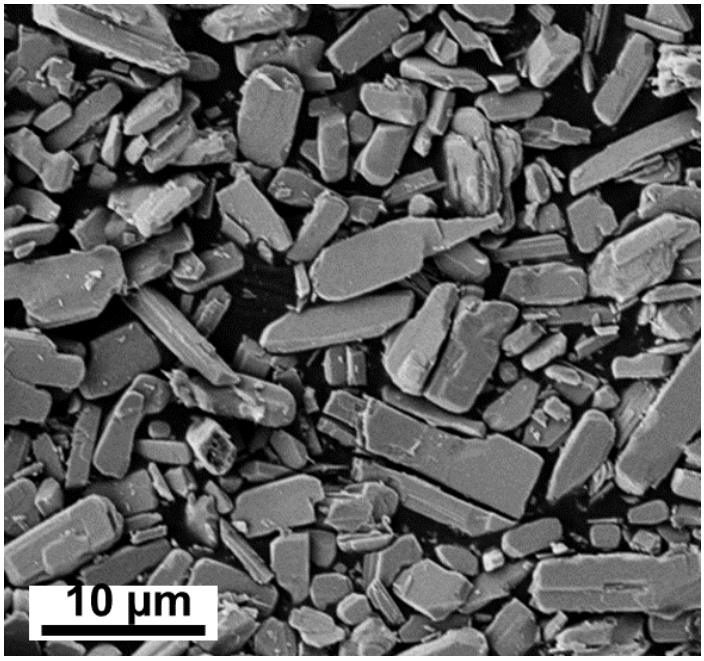

Figure S1: SEM image of MoO_3 under low magnification.

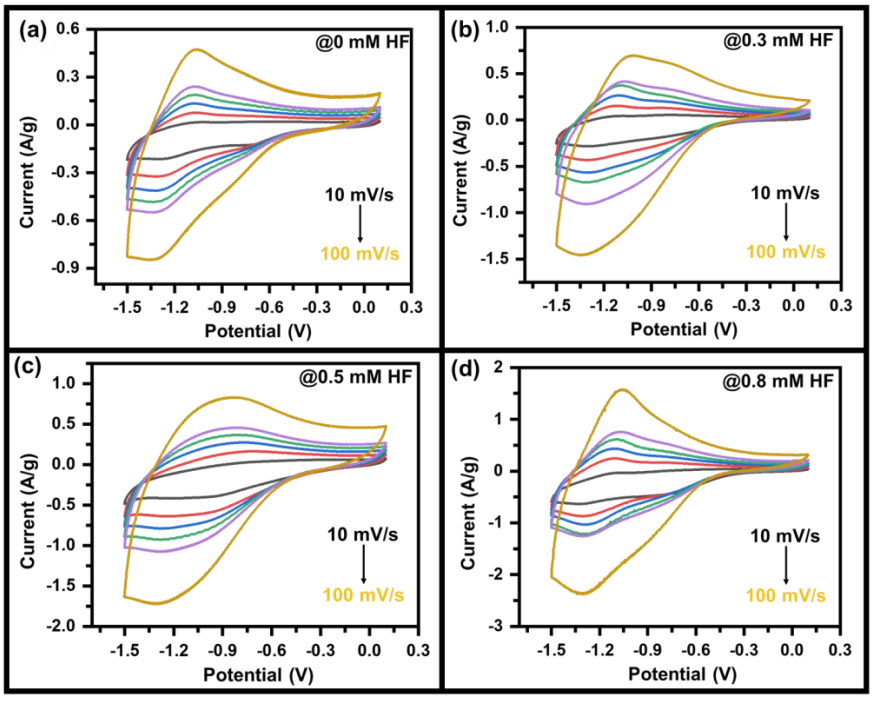

Figure S2: CV graph of MoO_3 at GCE at various concentration of HF (a) 0mM, (b) 0.3mM, (c) 0.5mM, and (d) 0.8mM HF at different scan rates.

Estimation of specific capacitance

The specific capacitance of active material is calculated From CV curves using the equation[1] as below-

$$C_s = \frac{\oint IdV}{2vm\Delta V}\ (F/g)\ , \qquad \text{(S1)}$$

where $\oint IdV$ is the area under CV curve, m is the mass of active material on GCE, ΔV is potential window of CV curve, and v is the scan rate. The specific capacitance of active material and prepared symmetric supercapacitor device is also calculated From CV curves and GCD plots using the equation[2] as below-

$$\mathrm{C_s} = \frac{\mathrm{I\Delta t_d}}{\mathrm{m\Delta V}}\ (\mathrm{F/g})\ , \qquad \text{(S2)}$$

where Δt_d is the discharging time.

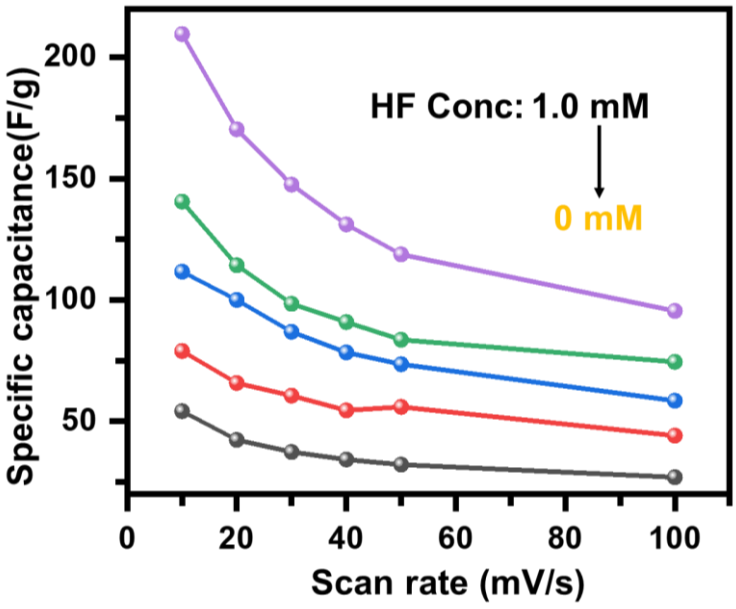

Figure S3: Variation of specific capacitance as a function of scan rate at various concentration of HF acid.

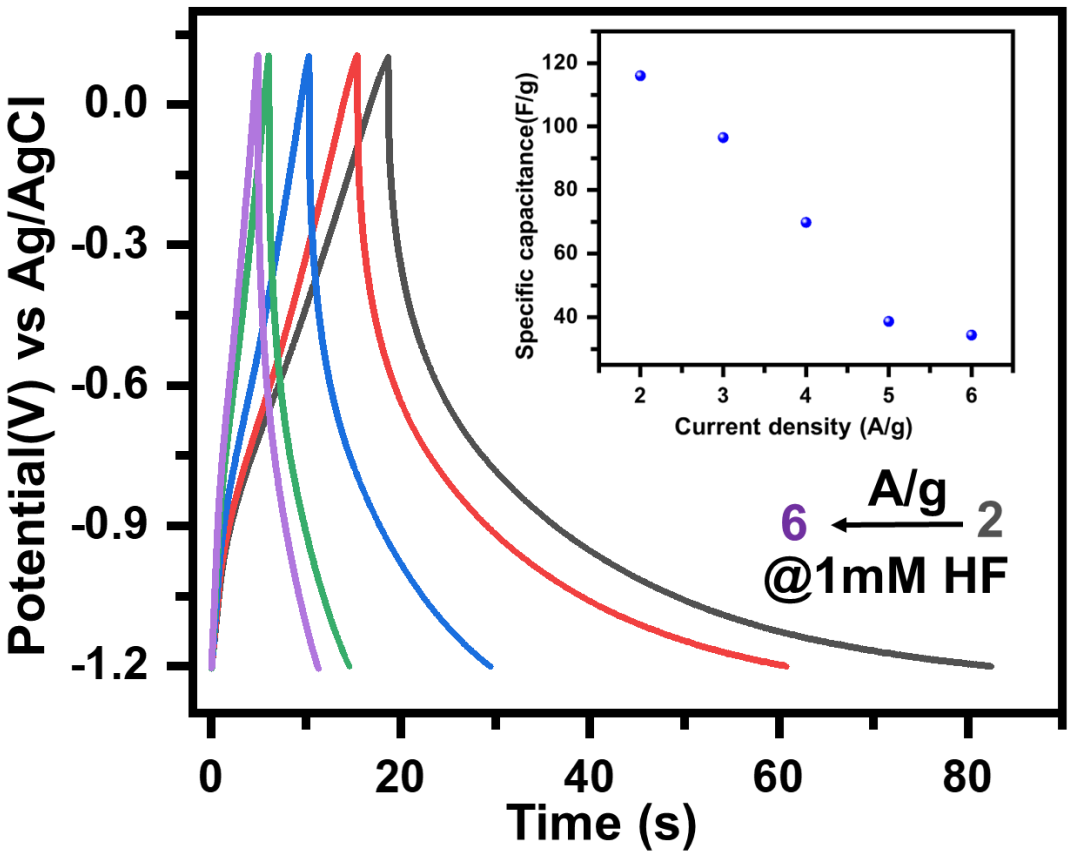

Figure S4: Galvanostatic charging discharging curve of MoO_3/GCE with 1mM HF in electrolyte (inset: Variation of specific capacitance as a function of current density).

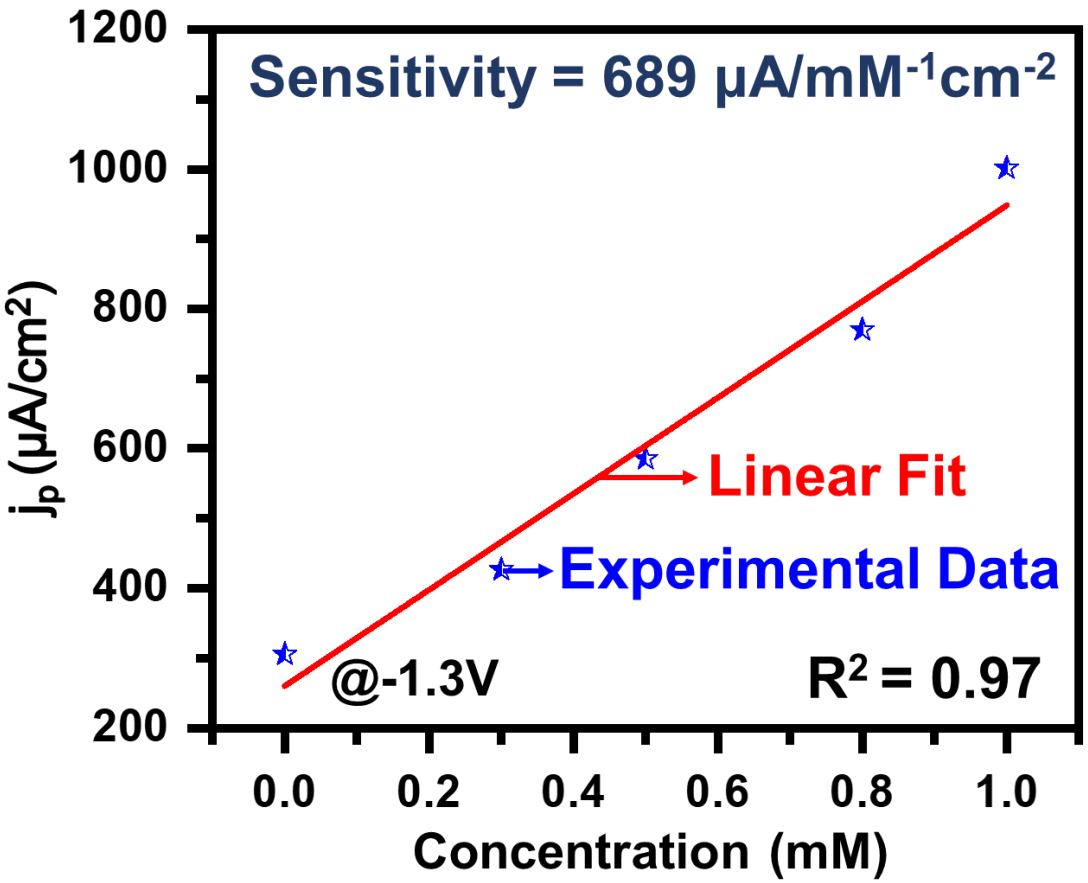

Figure S5: Variation of peak current density with HF concertation.

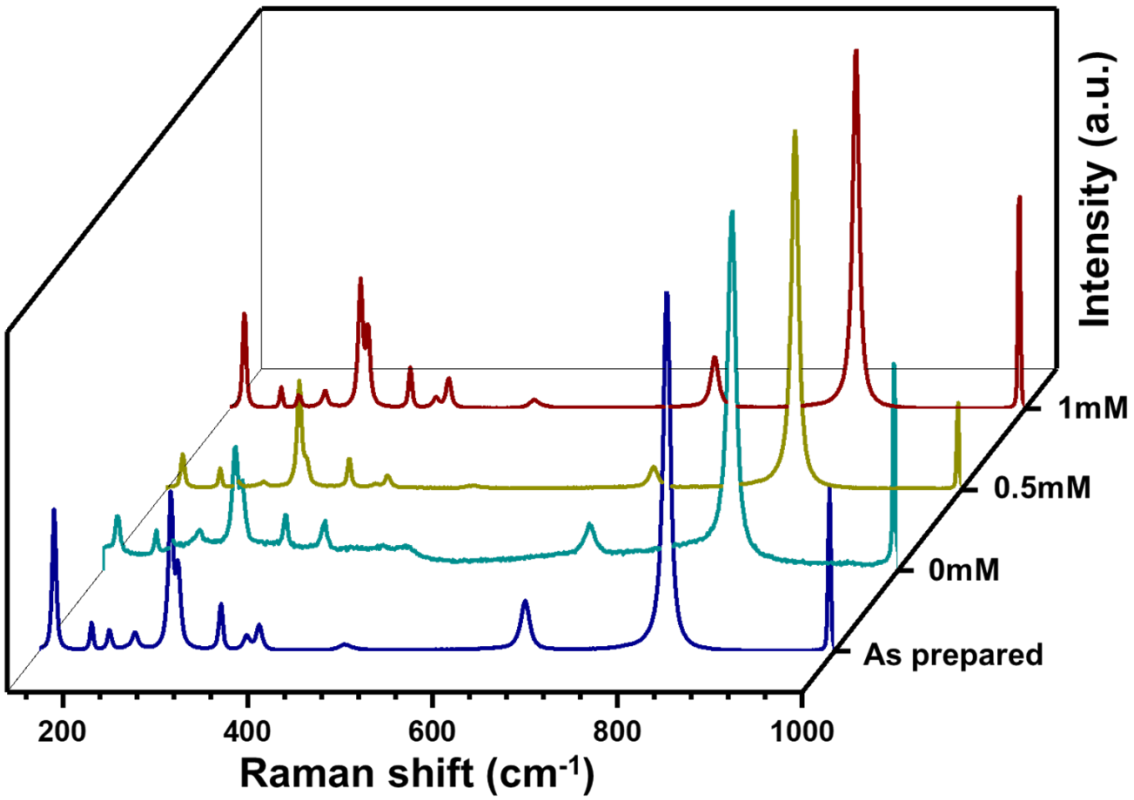

Figure S6: Raman shift of MoO_3 before (as prepared) and after (0mM, 0.5 mM, and 1.0 mM HF+ 0.5M $LiClO_4$) electrochemical characterization.

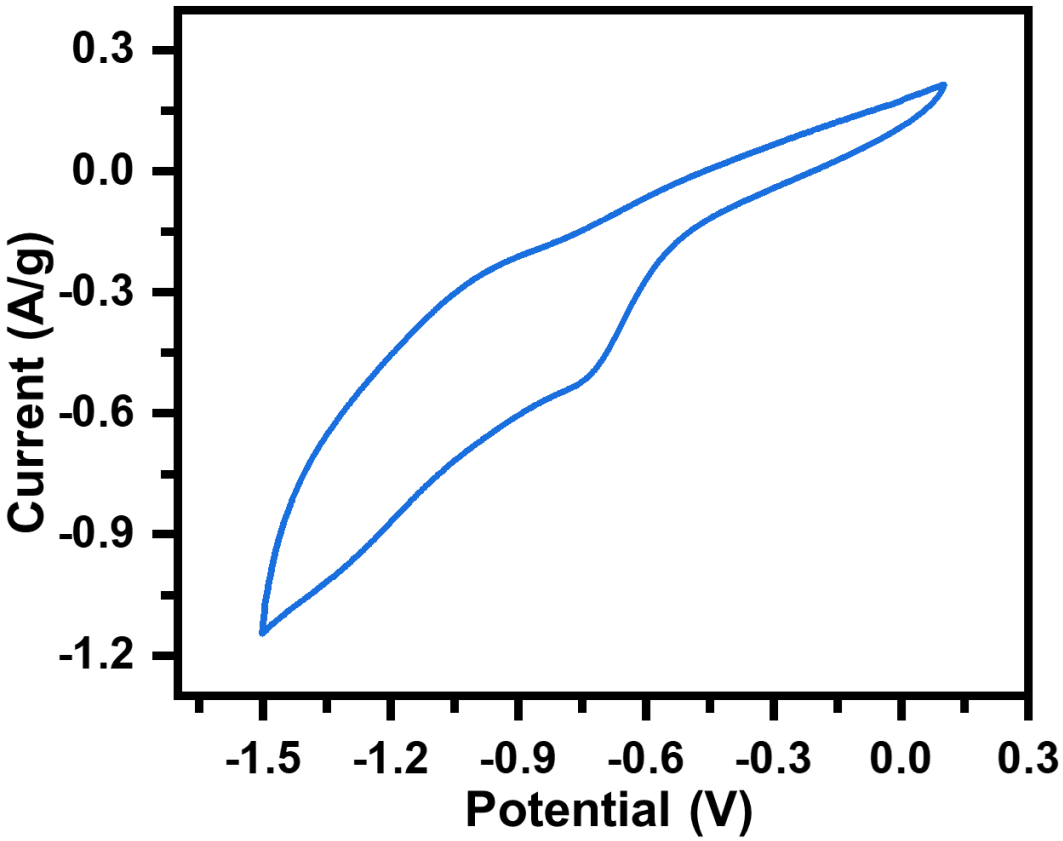

Figure S7: CV graph of MoO_3/CC at 50 mV/s.

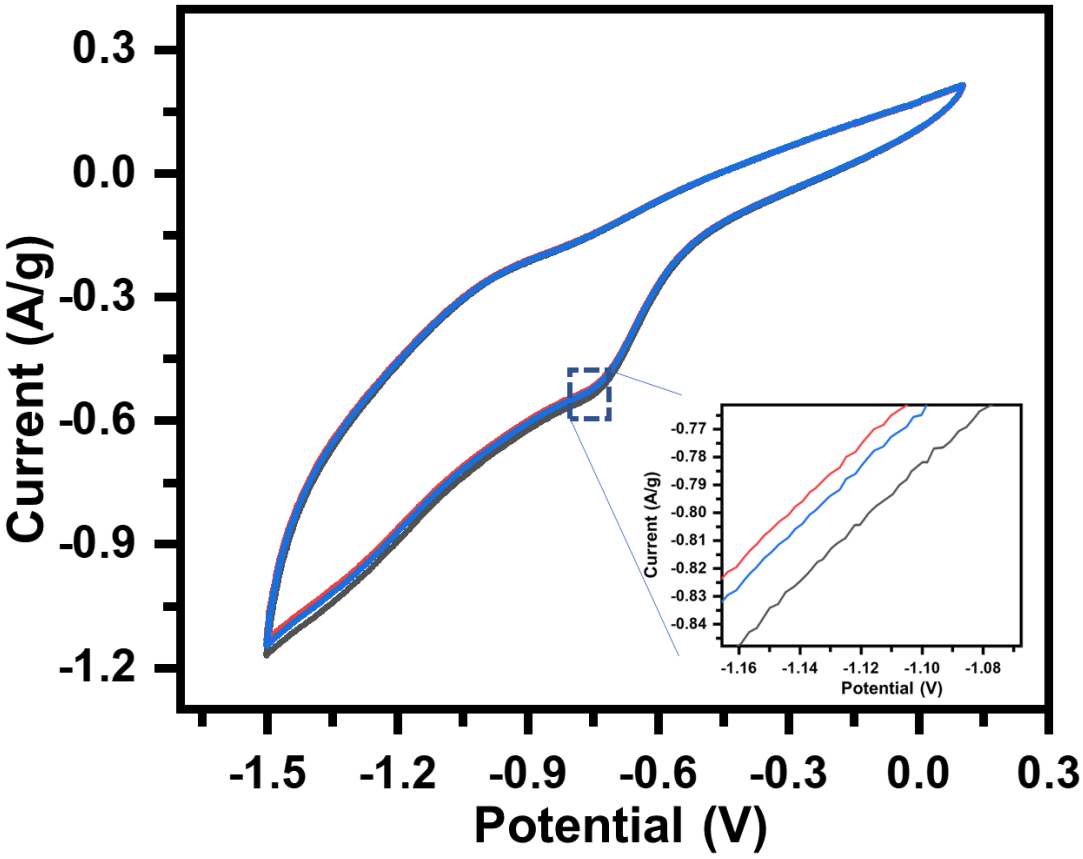

Figure S8: CV curve of MoO_3/CC on three different batches at 50 mV/s.

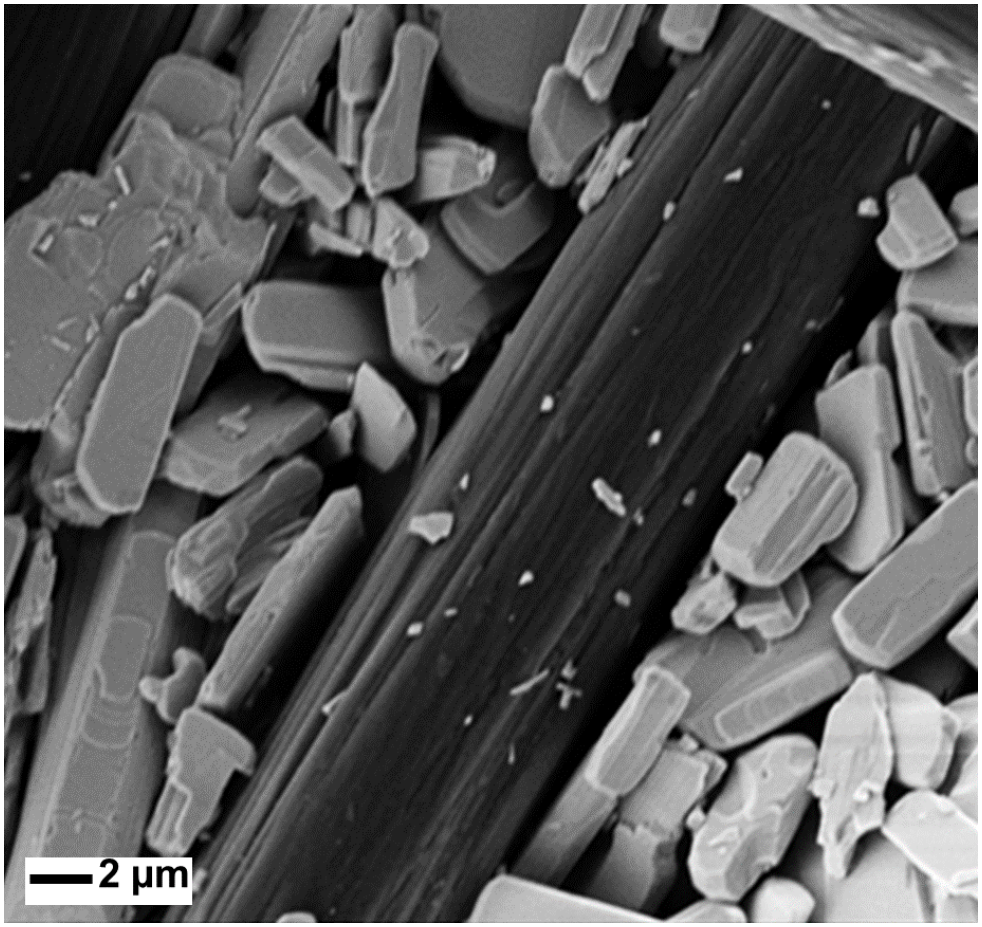

Figure S9: SEM image of MoO_3/CC

References

(1) Yang, P.; Mai, W. Flexible Solid-State Electrochemical Supercapacitors. *Nano Energy* **2014**, *8*, 274–290. https://doi.org/10.1016/j.nanoen.2014.05.022.
(2) Alam, M.; Karmakar, K.; Pal, M.; Mandal, K. Electrochemical Supercapacitor Based on Double Perovskite Y2NiMnO6 Nanowires. *RSC Adv.* **2016**, *6* (115), 114722–114726. https://doi.org/10.1039/C6RA23318J.