## **Supplementary Information**

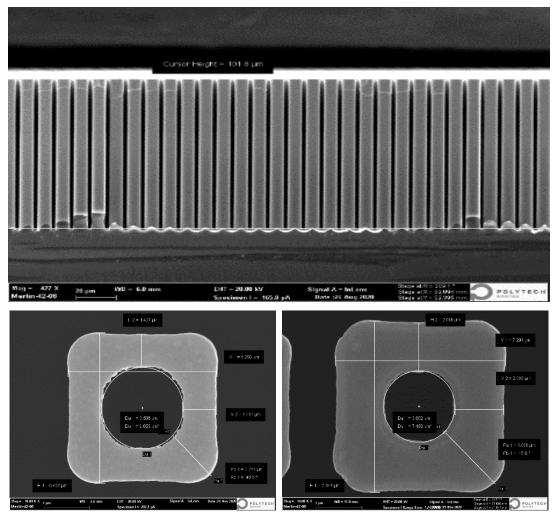


Figure S1: (a) Cross section of one electrode. Top view of one microtube (b) before and (c) after  $MnO_2$  deposition.

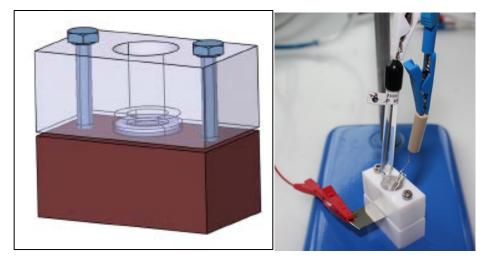


Figure S2: (a) Drawing of the flat cell used for SPECS measurements and (b) picture of the experimental set-up.

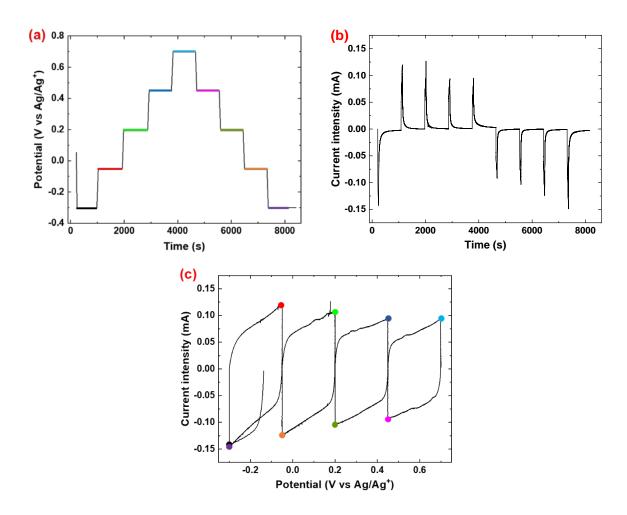


Figure S3: (a) Evolution of the electrode potential during cycling, the colors of the potentiostatic steps corresponds to the colors of the Raman spectra displayed in the paper. Current versus (b) time and (c) potential.

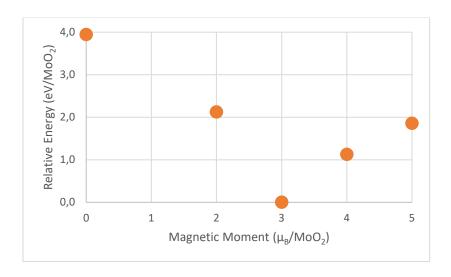


Figure S4: Calculated Relative Energy for monolayer  $MnO_2$  as a function of system magnetic moment