

Electronic Supplementary Information

Cu Doped V_2O_5 Flowers as Cathode Material for High-Performance Lithium Ion Batteries

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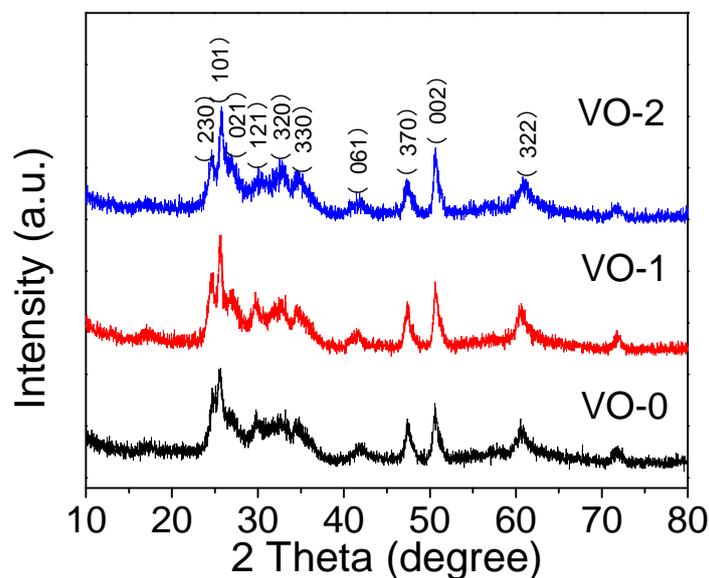


Fig. S1 The XRD patterns of the as synthesized samples before anneal: VO-0, VO-1 and VO-2.

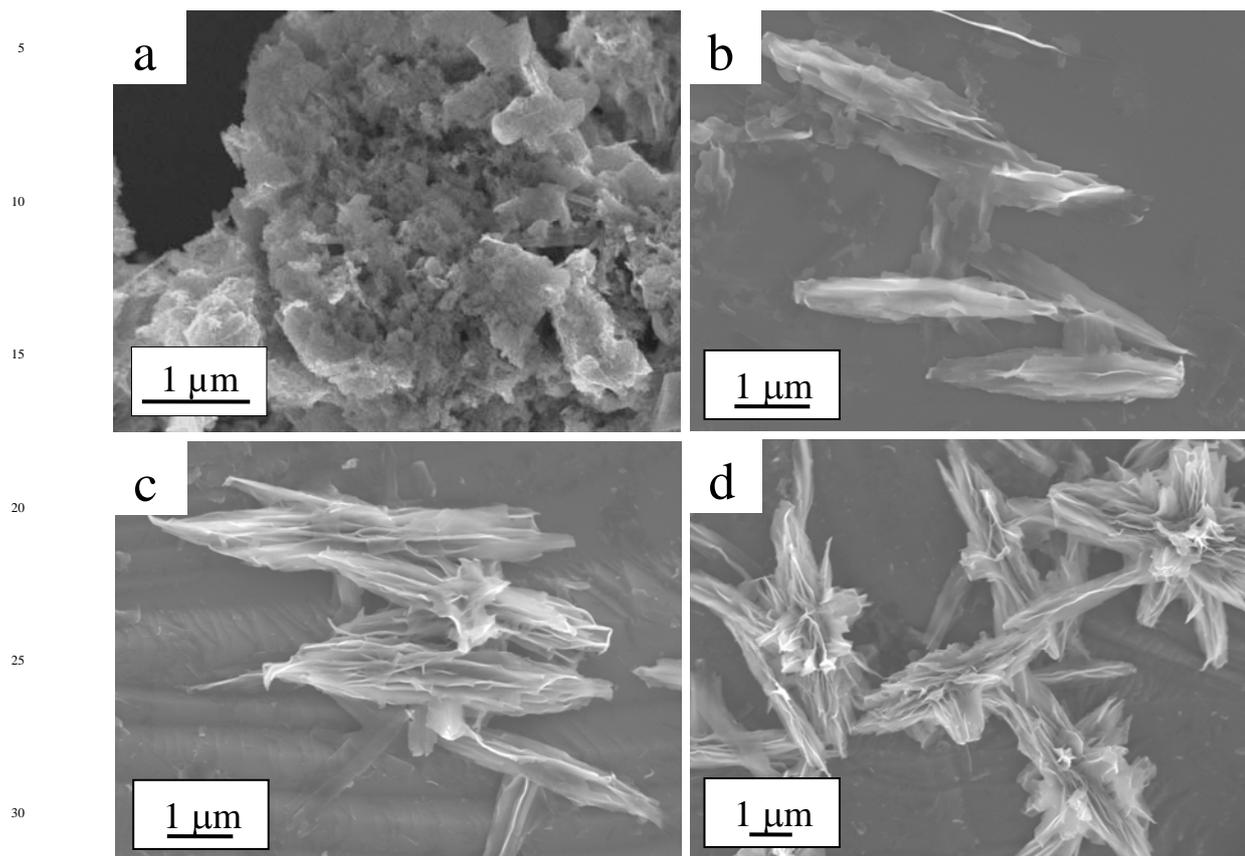


Fig. S2 FESEM images of the VO-0 sample collected at different hydrothermal time: (a) 30min, (b) 60min, (c) 80min and (d) 100min.

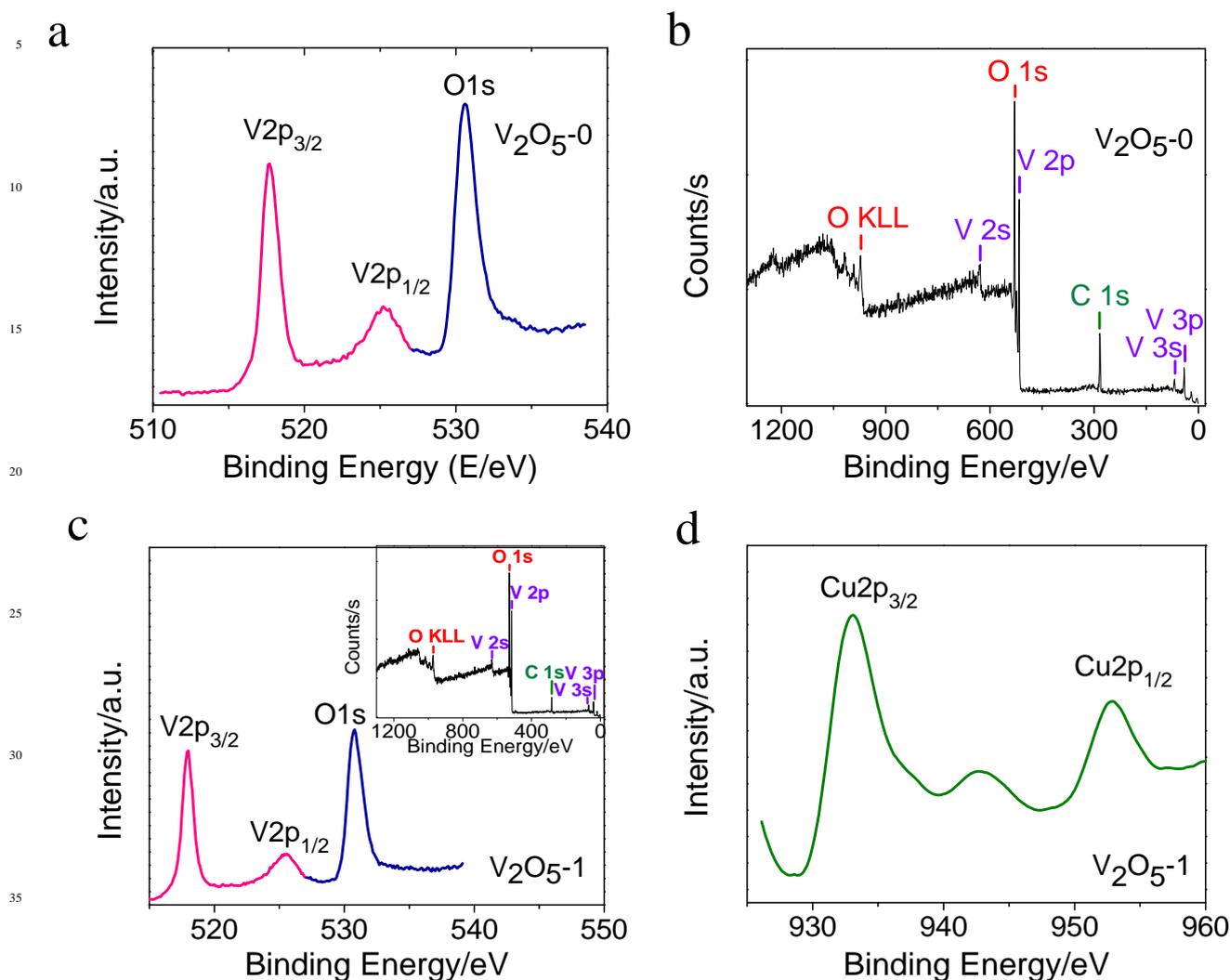
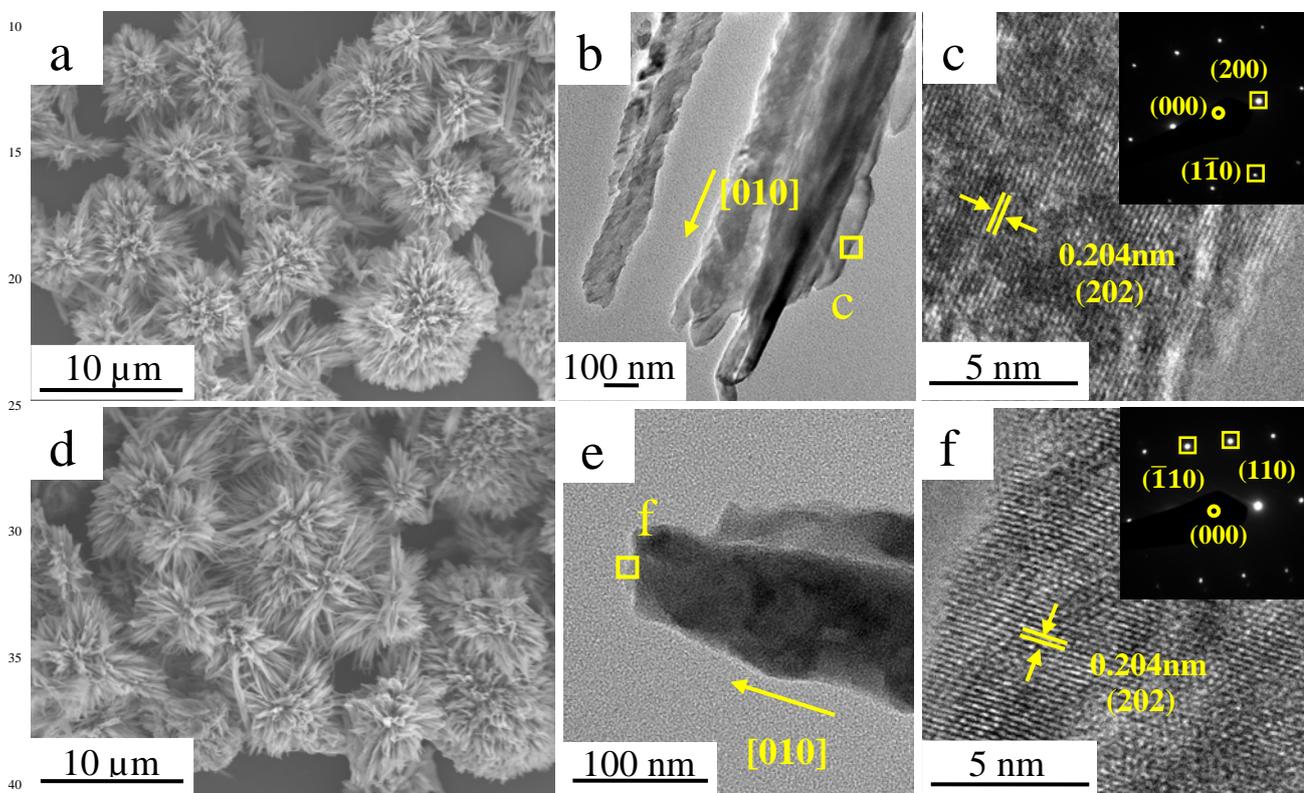


Fig. S3 (a) The corresponding XPS spectra for the O 1s and V 2p bands, (b) XPS wide-scan survey of sample V₂O₅-0. (c) The corresponding XPS spectra for the O 1s and V 2p bands, Insert: XPS wide-scan survey of sample V₂O₅-1. (d) The corresponding XPS spectra for the Cu 2p bands of sample V₂O₅-1.

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45 **Fig. S4** Representative FESEM images of the post annealing samples (a) V₂O₅-0 and (d) V₂O₅-1. Representative TEM images of the post
annealed samples (b) V₂O₅-0 and (e) V₂O₅-1. Representative HRTEM images and its selected area electron diffraction (SAED) pattern
(insert) of post annealed samples (c) V₂O₅-0 and (f) V₂O₅-1 with zone axis [001].

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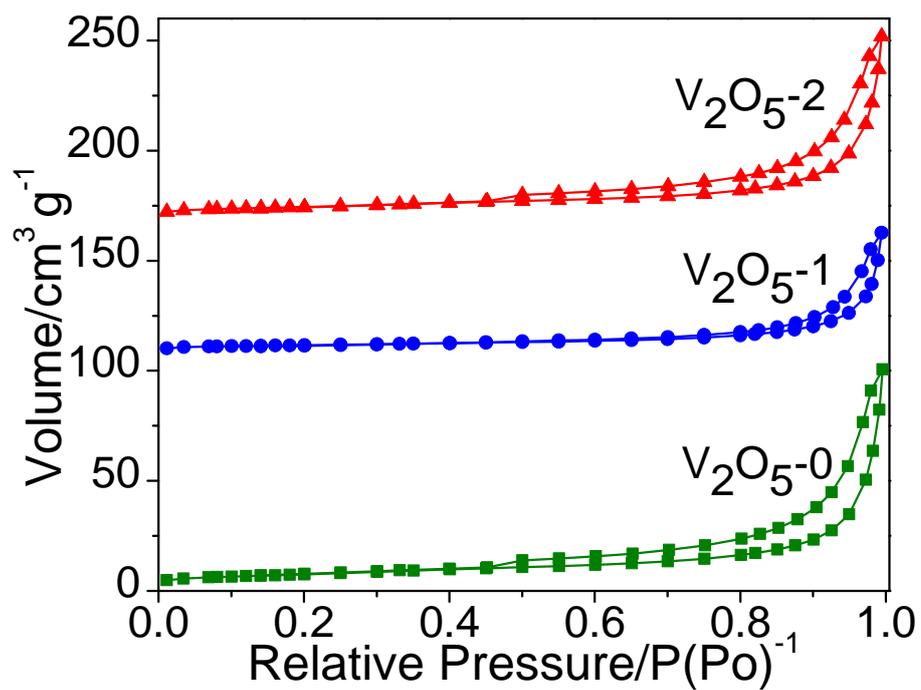


Fig. S5 Nitrogen adsorption/desorption isotherm and of the post annealing samples: V₂O₅-0, V₂O₅-1 and V₂O₅-2.

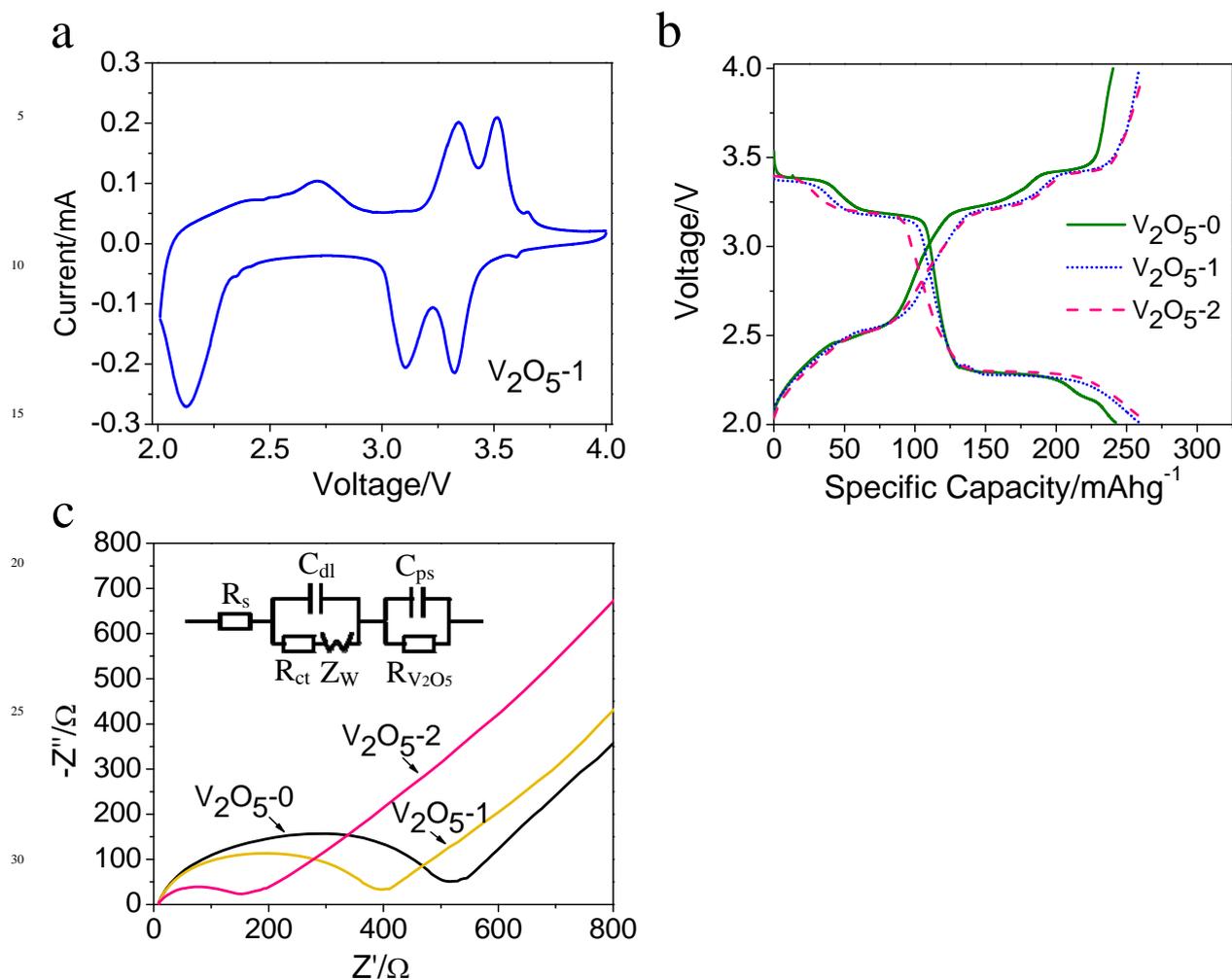


Fig. S6 (a) CV curve of second cycle at a scan rate of 0.2 mV s^{-1} of sample V_2O_5-1 . (b) Galvanostatic charge-discharge voltage profiles of the first cycle at a current density of 58.8 mA g^{-1} (0.2 C). (c) Electrochemical impedance spectra of all three electrodes measured at the 4th fully discharged state. Inset: The equivalent electrical circuit model for impedance analysis, where R_s is the electrolyte resistance, R_{ct} is the charge transfer resistance, C_{dl} is the double layer capacitance, Z_W is the Warburg diffusion resistance, C_{ps} is the pseudocapacitance from V_2O_5 and $R_{V_2O_5}$ is the internal resistance of the V_2O_5 electrode.

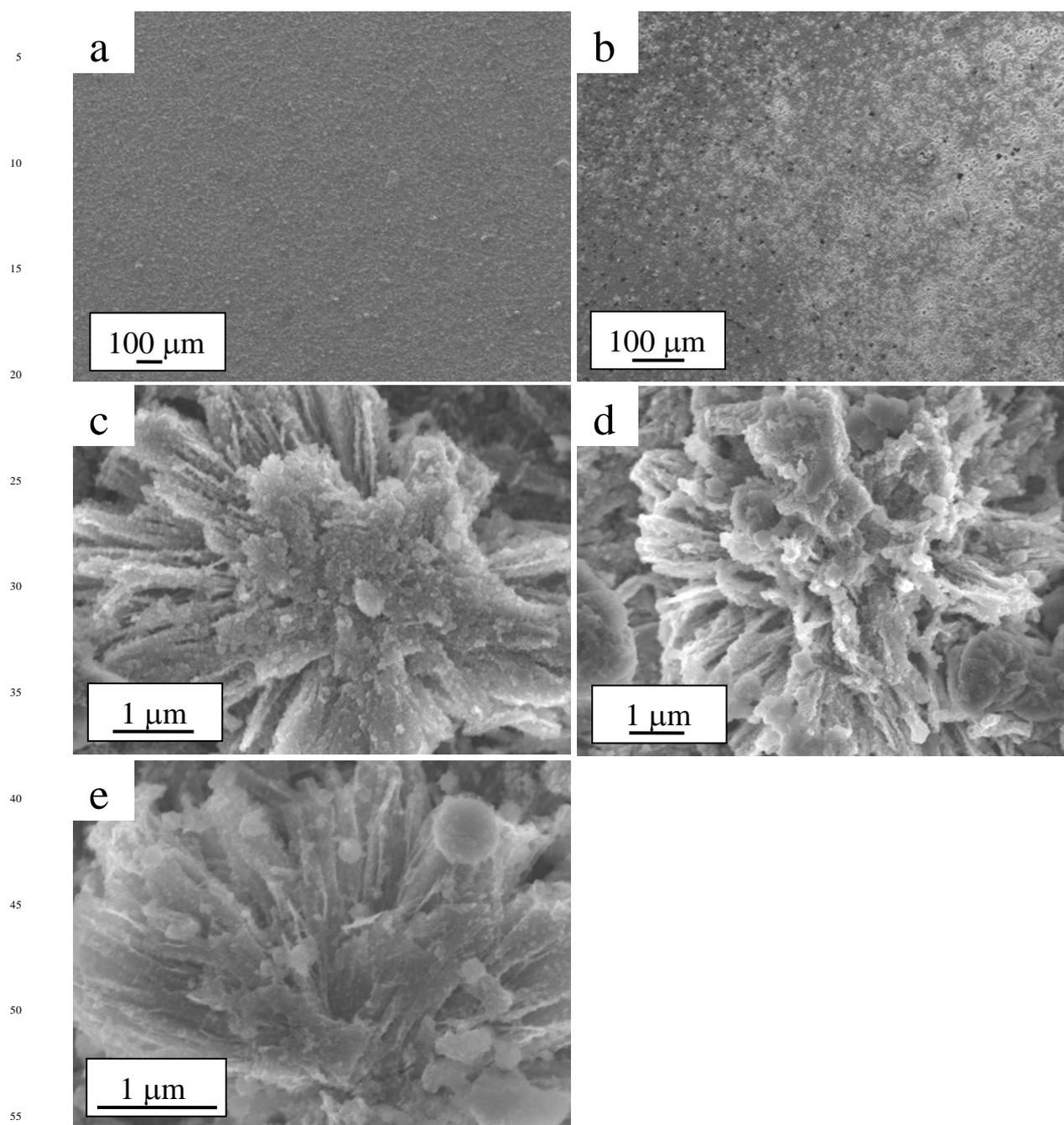


Fig. S7 Post-mortem FESEM images of electrode films before and after 50 cycles. Low magnification FESEM images of the V_2O_5 -2 electrode film (a) before and (b) after cycles. Representative FESEM images of the samples after cycling (c) V_2O_5 -0, (d) V_2O_5 -1 and (e) V_2O_5 -2.