Electronic Supplementary Information (ESI)

Direct planting of ultrafine $MoO_{2+\delta}$ nanoparticles in carbon nanofibers by electrospinning: self-supported mats as binder-free and long-life anodes for lithium-ion batteries

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Fig. S1 Photograph of the fresh binder-free C/$MoO_{2+\delta}$ electrode.

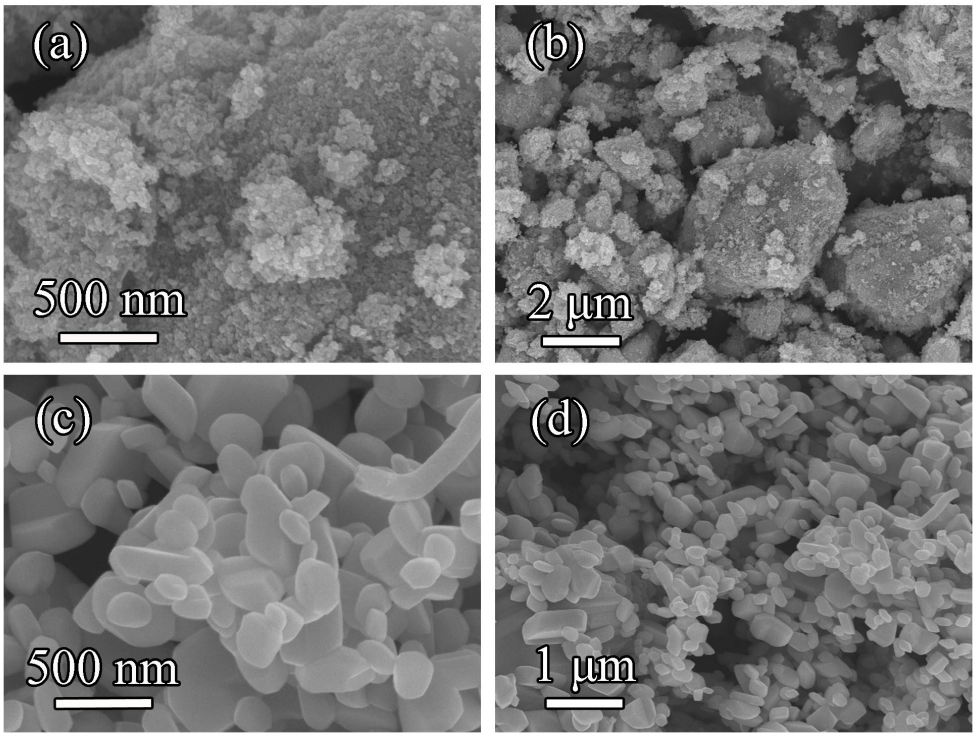

Fig. S2 SEM images of (a, b) MoO_x nanoparticles; (c, d) compared particles prepared by heating MoO_x nanoparticles at 700 °C for 2 h in N_2.

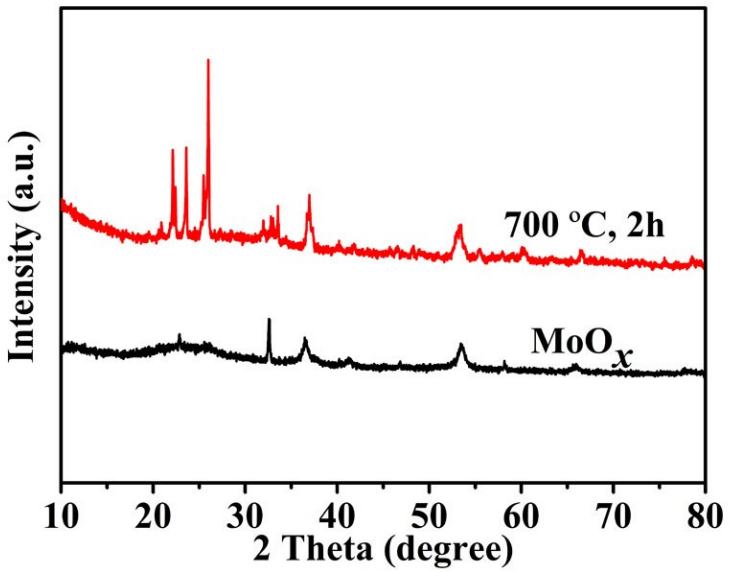

Fig. S3 XRD patterns of MoO_x nanoparticles and compared sample prepared by heating MoO_x at 700 °C for 2 h in N_2.

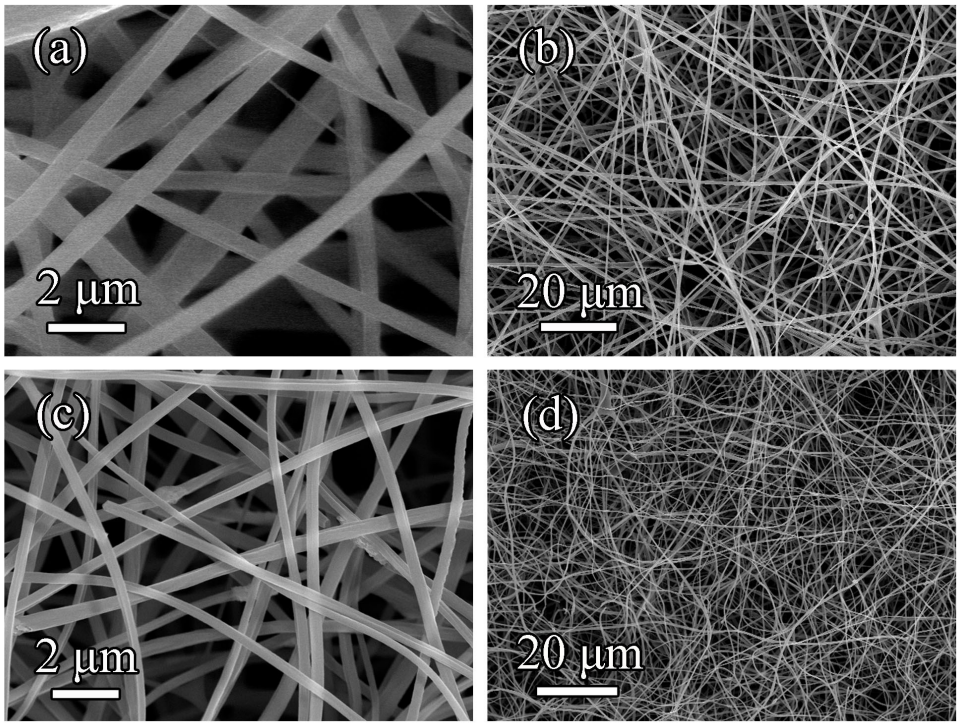

Fig. S4 M-0.3: SEM images of (a,b) electrospun precursor and (c,d) the obtained nanofibers by treating the precursor at 700 °C for 2 h in N_2.

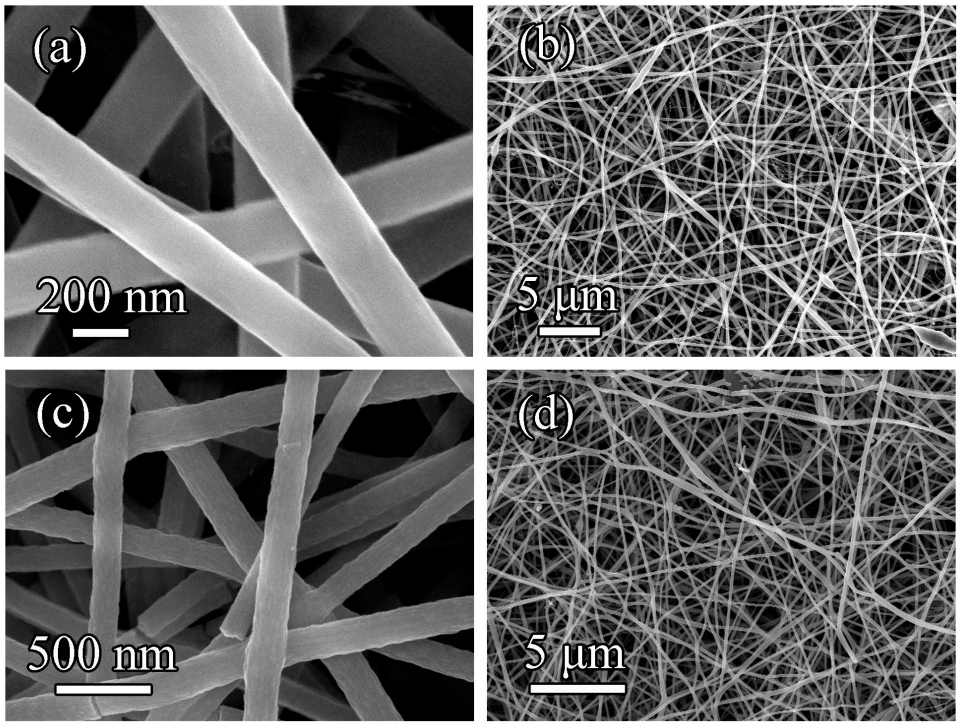

Fig. S5 M-0.5: SEM images of (a,b) electrospun precursor and (c,d) the obtained nanofibers by treating precursor at 700 °C for 2 h in N_2.

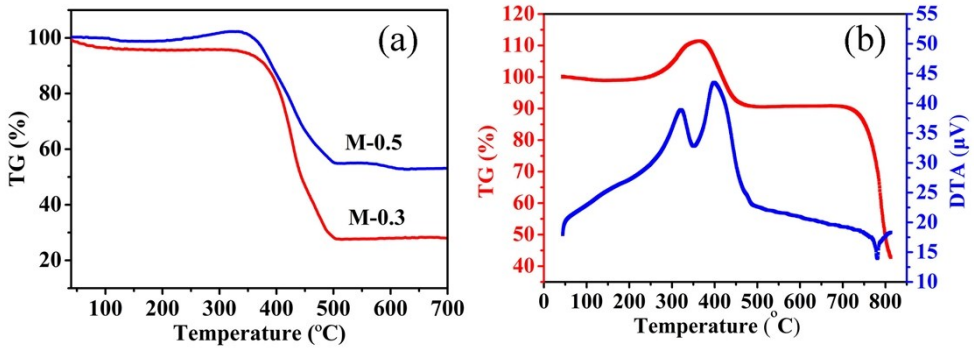

Fig. S6 (a) TG curves of M-0.5 and M-0.3 nanofibers synthesized by treating precursors at 700 °C for 2 h in N_2; (b) TG/DTA curves of the as-prepared C/$MoO_{2+\delta}$ composite nanofibers. (The calculated carbon contents in sample M-0.5 and M-0.3 is 52.5 and 73.2 wt%, respectively). As shown in Fig. S6 (b), the weight change between 200 °C and 600 °C is owing to both the oxidation of $MoO_{2+\delta}$ and the combustion of carbon. The two exothermic peaks between 260-350 °C and 350-500 °C in the DTA profile can be assigned to the oxidation of $MoO_{2+\delta}$ and the combustion of the carbon, respectively. While the endothermic peak between 780-820 °C corresponds to the eliquation and volatilization of MoO_3.

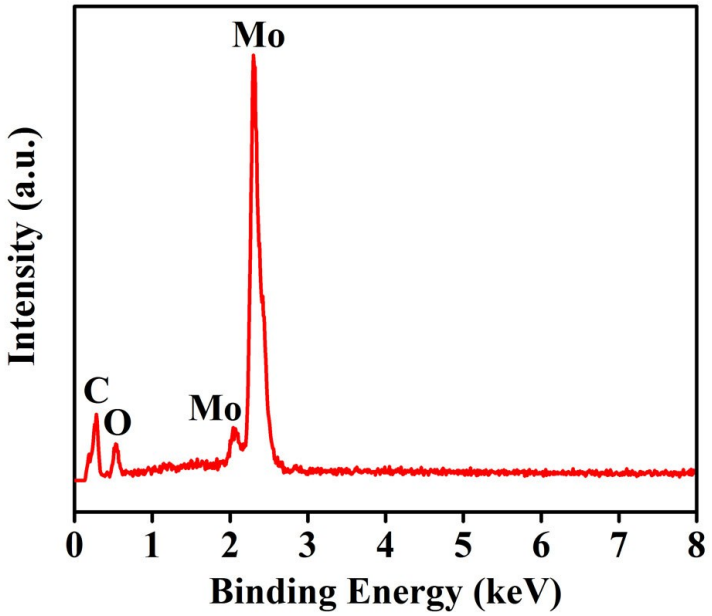

Fig. S7 EDX spectrum of prepared C/$MoO_{2+\delta}$ nanofiber composites.

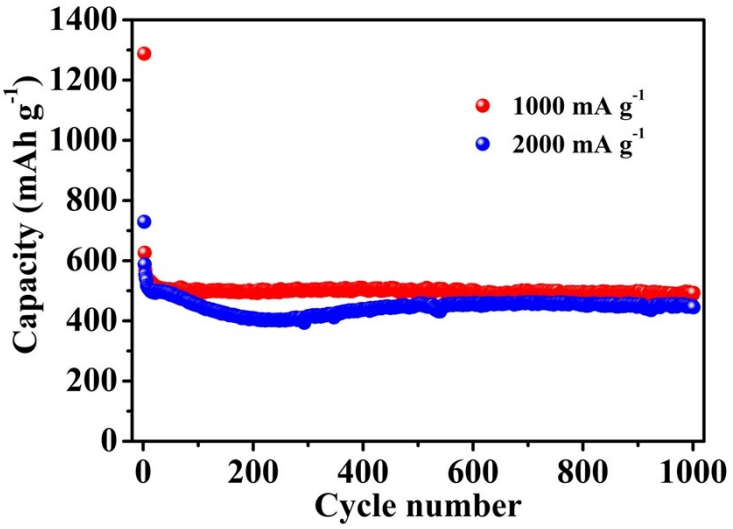

Fig. S8 Cycling properties of the binder-free C/$MoO_{2+\delta}$ electrode in the potential range of 3–0.01 V *vs.* Li/Li^+ at different current densities of 1000 and 2000 mA g^{-1}.

Table S1. Comparison of battery performance of MoO_x/C as anode in Li-ion batteries

Sample	Current density (mA/g)	Cycle number	Specific capacity (mAh/g)	References
Carbon coated MoO_2	50	50	762.7	6
Hierarchical MoO_2 nanoarchitecture	200	20	719.1	7
MoO_2 graphene thin film	47.8	100	675.9	9
MoO_2/MoC heteronanotubes	200	140	790	10
MoO_{3-x} nanowire arrays	50	20	630	12
MoO_2/graphene	500	70	848.6	16
MoO_2/C	50	350	734	18
Carbon coated MoO_2 nanobelts	100	30	617.2	19
rGO wrapped MoO_2 porous nanobelts	5000	1900	420	20
MoO_2/C nanosheets	500	100	1051	21
3D C/$MoO_{2+\delta}$ networks	**200** **2000**	**250** **1000**	**876.9** **447.9**	**Current work**

The references are from the main text.