Supporting Information

Facile synthesis of α-MoO_3 nanoplates/TiO_2 nanotubes composite for high electrochemical performance

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After calcination treatment at 450 ˚C for 1 h, the obtained crystalline TNTs were treated with electrochemical process to prepare composite electrode materials. The detailed process was described in the manuscript. The effect of deposition cycles on microstructure, surface micrograph, and electrochemical performance of composite electrodes was investigated. Fig. S1 shows the XRD patterns of MoO_3-coated TNTs. The peaks with 2θ of ~ 27.2˚, ~ 33.7˚ and ~ 49.2˚ are indexed to orthorhombic α-MoO_3. The amount of α-MoO_3 increases with increasing deposition cycles. From Fig. S2 it can be seen the Mo amounts of samples deposited for 10 cycles, 15 cycles, and 20 cycles are 8.0 wt.%, 9.0 wt.%, and 21.1 wt.%, respectively. The sample deposited for 20 cycles has highest amount of Mo element, which agrees with the results of XRD patterns. Fig. S3 shows the surface morphology of samples deposited for 10 cycles (a), 15 cycles (b) and 20 cycles (c, d). Deposition for 10 and 15 cycles results in a uniform α-MoO_3 layer on the TNTs substrate. In this case, there also are a large number of pores. Upon further increase in cycle numbers, severe agglomeration of the

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nanoplates is observed (Fig. S3c and d). Such agglomeration results in the formation of dense film. Hence, we successfully prepare MoO_3 layer with different thickness. With increasing deposition cycles, more and more nanoplates aggregate with each other, leading to the increase of MoO_3 and decrease of pores. As known, the existence of pores is beneficial to ions transfer and decrease of inner resistance of electrode material. So, there is an optimum cycle which possesses better electrochemical behavior than that of other deposition samples. Subsequently, electrochemical behaviors of the samples via different deposition cycles are investigated. The areal capacitances are 35.78 mF cm^{-2} (10 cycles), 37.22 mF cm^{-2} (15 cycles), 43.42 mF cm^{-2} (17 cycles) and 40.29 mF cm^{-2} (20 cycles) at a scan rate of 20 mV s^{-1}, respectively (Fig. S4). It is to be noted that the electrochemical properties are not always improved with increasing deposition cycles. Although the sample deposited for 20 cycles has highest amount of MoO_3, its electrochemical performance is poorer than that of the sample deposited for 17 cycles, which is attributed to its dense structure. Therefore, we systematically study the electrochemical performance of MoO_3 deposited via 17 cycles on the different substrates in the manuscript.

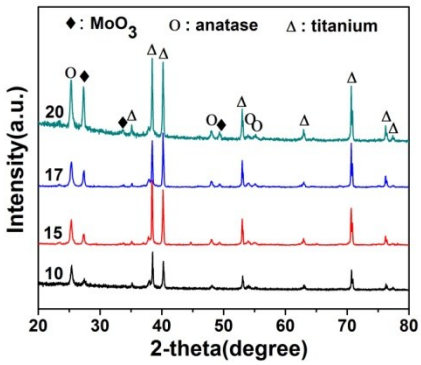

Fig. S1 XRD patterns of samples deposited for 10 cycles, 15 cycles, 17 cycles and 20 cycles.

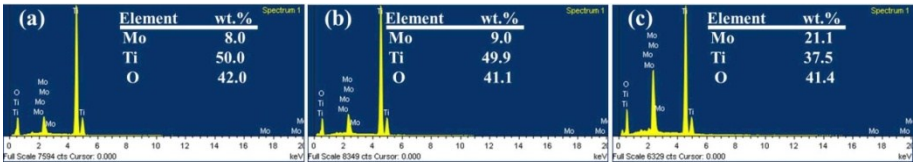

Fig. S2 EDS spectra of the samples deposited for 10 cycles (a), 15 cycles (b) and 20 cycles (c).

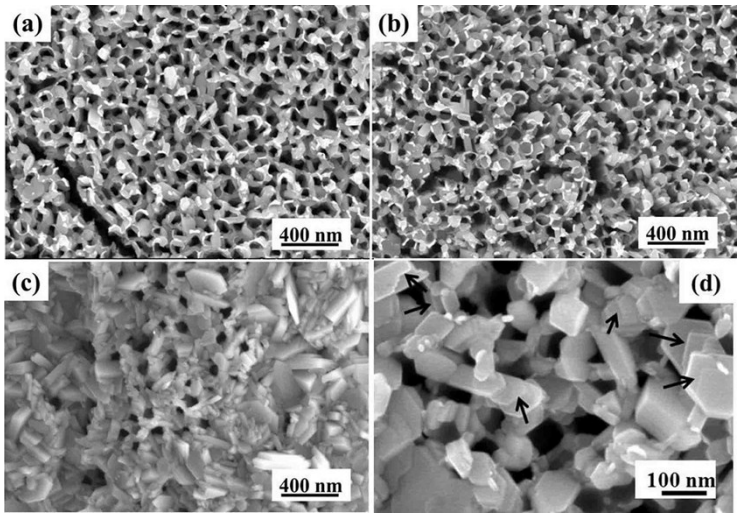

Fig. S3 Top view of the samples deposited for 10 cycles (a), 15 cycles (b) and 20 cycles (c, d).

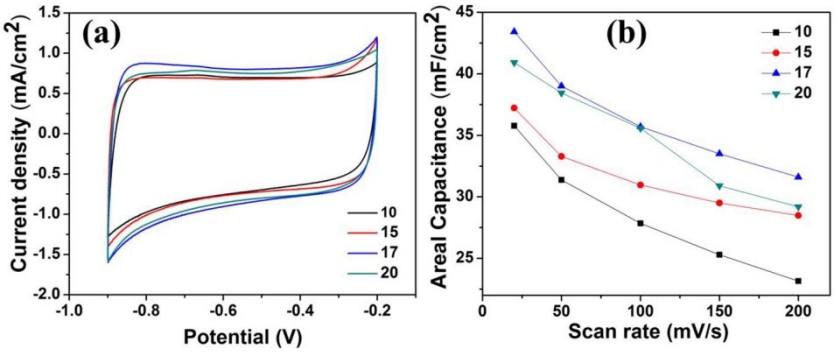

Fig. S4 CV plots of samples deposited for different cycles (a), and areal capacitances of samples measured as a function of scan rate (b).

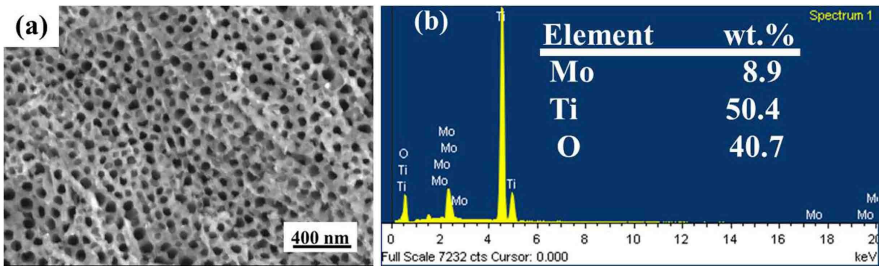

Fig. S5 SEM image (a) and EDS spectrum (b) of the sample achieved by galvanostatic charge-discharge testing of CMO-TNT at the current density of 0.6 mA cm^{-2} for 50 cycles.

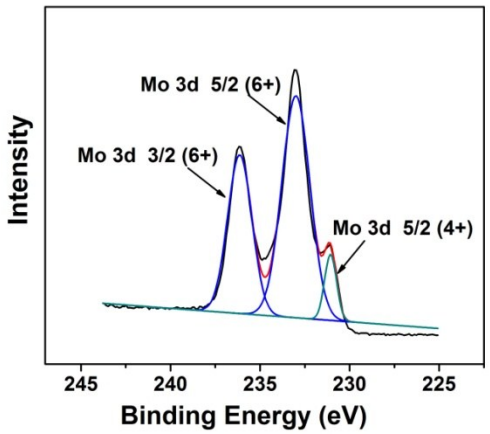

Fig. S6 XPS spectra in the Mo 3d binding energy region of the sample achieved by galvanostatic charge-discharge testing of CMO-TNT at the current density of 0.6 mA cm^{-2} for 50 cycles.