Electronic Supplementary Material (ESI) for RSC Advances.

Rational synthesis of hierarchical Mo_2C/C nanosheet composite with enhanced lithium storage properties

Xin Yue, Minglei Cao, Limeng Wu, Wei Chen, Xingxing Li, Yanan Ma, Chuankun Zhang**

School of Sciences, Hubei University of Automotive Technology, Shiyan 442002, P. R. China.

* Corresponding authors: Minglei Cao, cml07114052@163.com; Chuankun Zhang, zhangchk_lx@huat.edu.cn

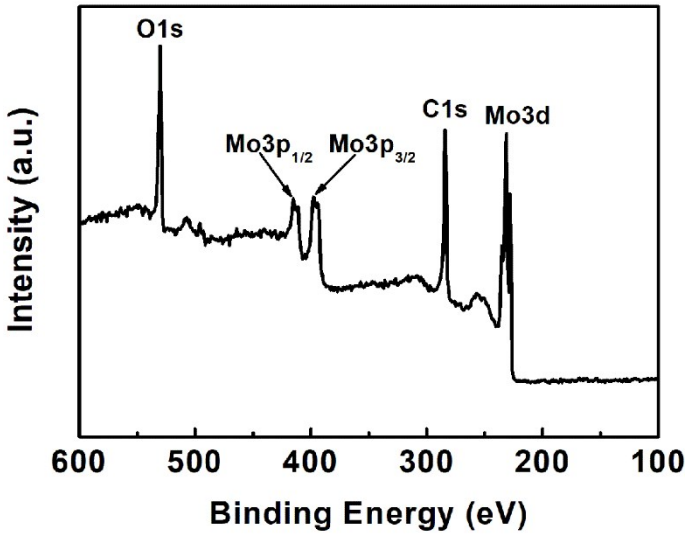

Fig. S1 XPS survey spectrum of Mo_2C/C-2.

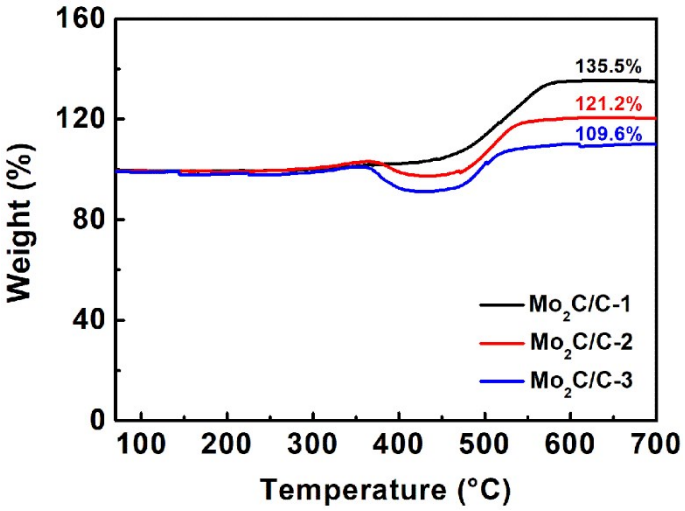

Fig. S2 TGA curves of various Mo_2C/C nanosheet composites in air.

From the TGA curves, the carbon contents can be calculated using Formula S1:

$$w(C) = 1 - \frac{w(re) \times M(Mo2C)}{2M(MoO3)} = 1 - \frac{w(re) \times 204}{2 \times 144} = 1 - 0.71w(re) \quad \text{(S1)}$$

where w(C) and w(re) represent the weight percentages of the carbon component and the residue, respectively; M(Mo_2C) and M(MoO_3) stand for the molecular weights of Mo_2C and MoO_3, respectively.

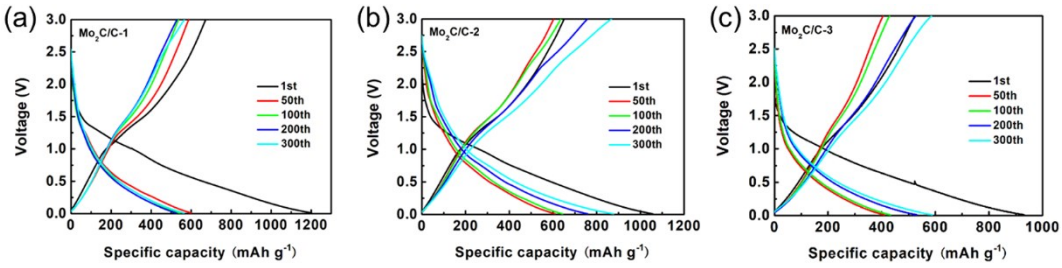

Fig. S3 The galvanostatic charge/discharge curves of (a) Mo_2C/C-1, (b) Mo_2C/C-2, and (c) Mo_2C/C-3 at different cycles.

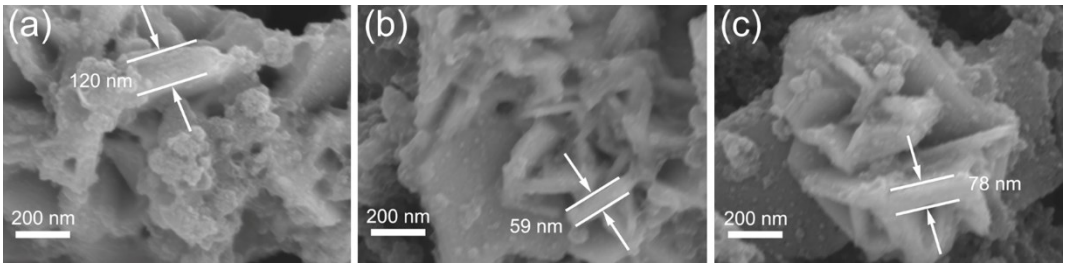

Fig. S4 SEM images of (a) Mo_2C/C-1, (b) Mo_2C/C-2, and (c) Mo_2C/C-3 after 300 cycles at the current density of 0.2 A g^{-1}.

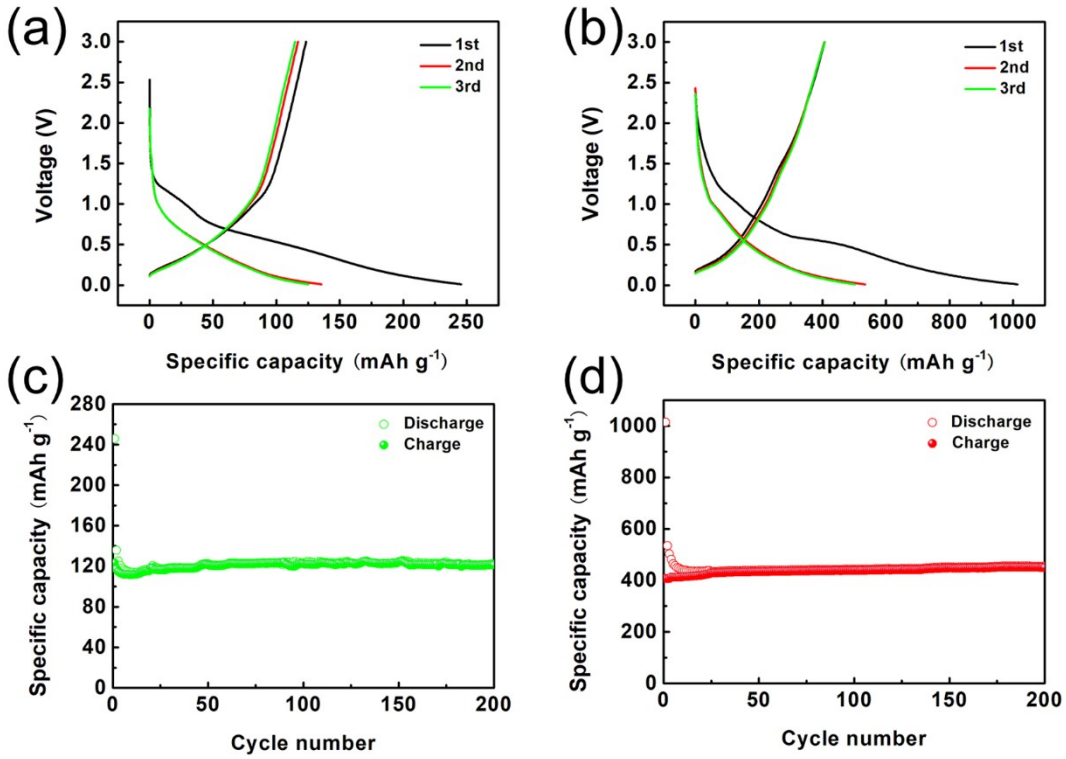

Fig. S5 The initial three charge/discharge curves of (a) p-C and (b) Mo_2C/C-4; Cycling performances of (c) p-C and (d) Mo_2C/C-4 at 0.2 A g^{-1}.

Table S1. Comparison of the cycling performance of hierarchical Mo_2C/C nanosheet composite with the published reports on Mo_2C-based materials.

Types of Mo_2C-based material	Current densities (A g^{-1})	Cycle numbers	Capacity retention efficiencies (%)	References
MoO_2-Mo_2C-C composite	2.0	70	56.0	15
Mo_2C/N-doped carbon heteronanowires	2.0	700	98.4	17
N, P co-doped Mo_2C/C nanosheets	0.15	200	86.9	18
3D Mo_2C@C-graphene aerogel	1.0	200	90.5	19
Hollow Mo_2C@C core-shell nanofibers	1.0	300	92.7	24
MoO_2/Mo_2C/C hybrid nanowires	2.0	500	145.0	27
MoO_2-Mo_2C-C microspheres	1.0	500	80.0	28
Mo_2C@onion-like carbon nanocomposites	0.5	100	91.7	29
Hierarchical Mo_2C/C nanosheet composite	**5.0**	**5000**	**122.1**	**This work**

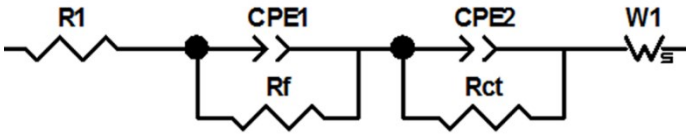

Fig. S6 The equivalent circuit of impedance spectra of Mo_2C/C nanosheet composites.

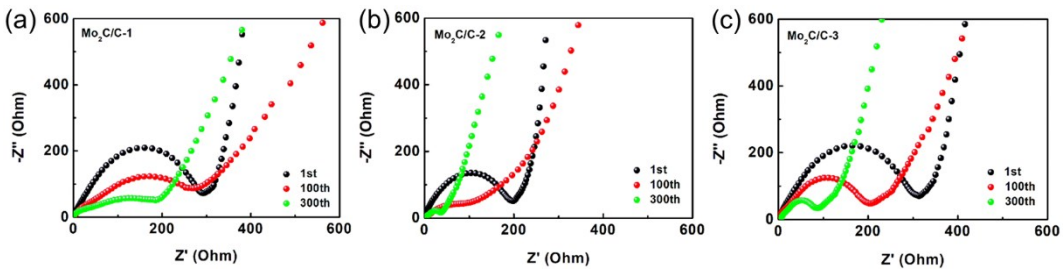

Fig. S7 Nyquist plots of (a) Mo_2C/C-1, (b) Mo_2C/C-2, and (c) Mo_2C/C-3 during cycling test.