A novel flower-like hierarchical aluminum-based MOF anode for high-performance lithium-ion batteries

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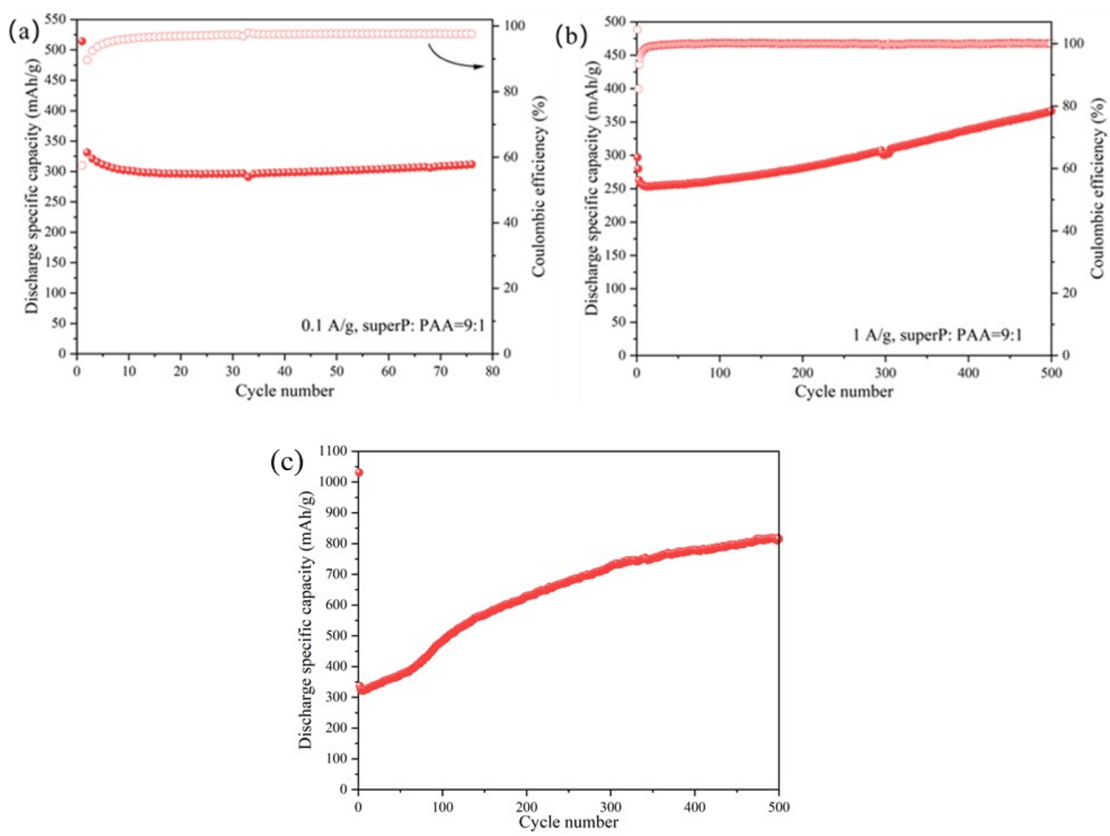

Fig. S1. Long-term cyclic performance of superP electrode (superP: PAA=9:1, the mass loading of super P is around 0.6 mg. cm^{-2}, 0.01-3.0 V). (a) 0.1 A/g, (b) 1 A/g. The contribution of carbon to the capacity was assessed and carbon for improved conductivity also contributes some capacity during cycling (about 120 mA h/g at 0.1 A/g, 100-148 mA h/g at 1 A/g). (c) Corrected long-term cyclic performance of FACM at 1 A/g. Contribution of conductive carbon materials has been subtracted (based on cyclic performance of pure super P, Fig. S1b).

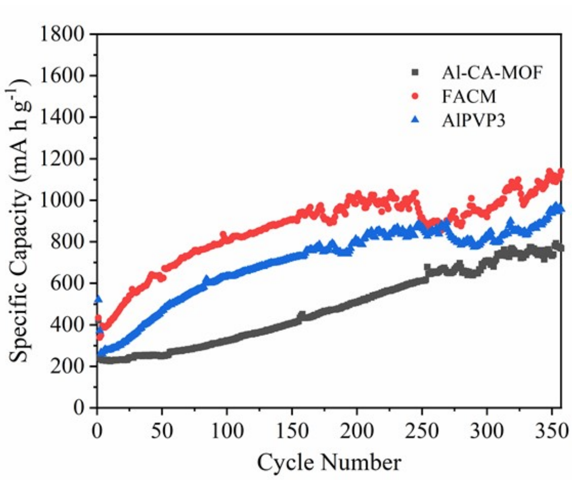

Fig. S2. Cycling performance of the Al-CA-MOF, FACM and AlPVP3 (indicate the product of adding 0 g, 1.5 g and 3g PVP, respectively)

Table. S1. Comparison of electrochemical performance of Al-MOF-based anodes.

Materials	Current density	Capacity	literature
Al-FumAs	0.0375 A/g	392 mA h/g after 100 cycles	1
Al-MOF/graphene composite	0.1 A/g	403 mA h/g after 100 cycles	2
	0.5 A/g	484 mA h/g after 1000 cycles	
	0.8 A/g	284 mA h/g after 1000 cycles	
	1.0 A/g	267 mA h/g after 1000 cycles	
	2.0 A/g	153 mA h/g after 1000 cycles	
FACM	0.1 A/g	1103 mA h/g after 350 cycles	Our work
	0.5 A/g	995 mA h/g after 500 cycles	
	1.0 A/g	962 mA h/g after 500 cycles	
	2.0 A/g	799 mA h/g after 500 cycles	
	5.0 A/g	610 mA h/g after 500cycles	

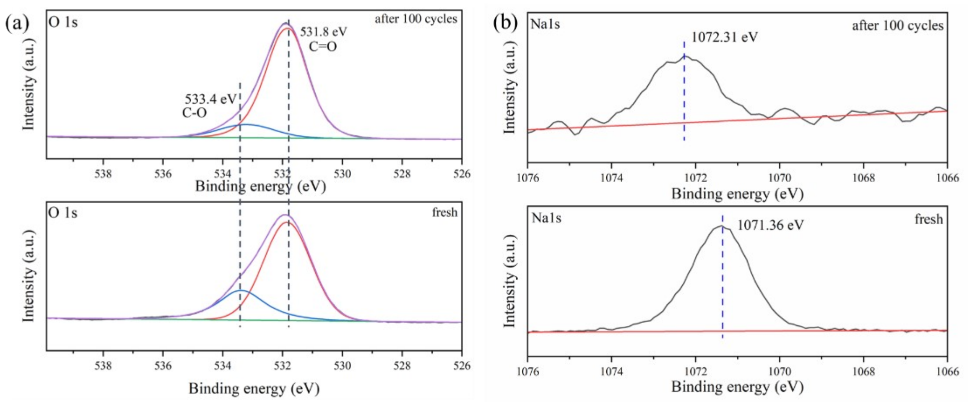

Fig S3. XPS measurement spectrum of FACM electrode before and after cycling. (a) O 1s and (b) Na 1s.

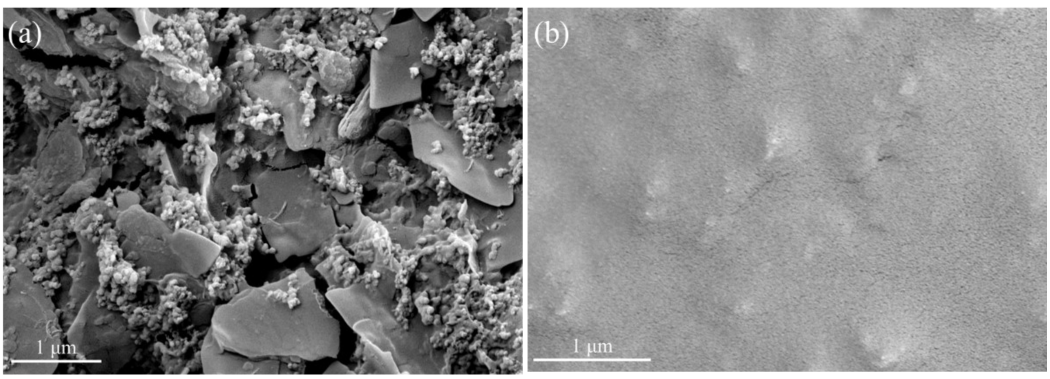

Fig S4. SEM images of the fresh electrode (a) and after 100 cycles electrode (b).

$$D_{Li^+} = \frac{R^2T^2}{2A^2n^4F^4C_{Li^+}^2\sigma^2} \quad 1\text{-}1$$

$$Z' = \sigma\omega^{-1/2} \quad 1\text{-}2$$

Equ. 1-1 and 1-2. The formula for calculating the diffusion coefficient of lithium ions.

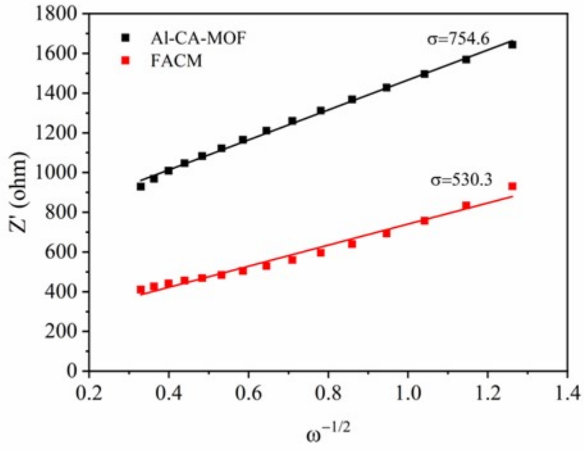

Fig. S5. The connection between Z′ and ω-1/2

1. Y. Wang, Q. Qu, G. Liu, V. S. Battaglia and H. Zheng, *Nano Energy*, 2017, **39**, 200-210.
2. C. Gao, P. Wang, Z. Wang, S. K. Kaer, Y. Zhang and Y. Yue, *Nano Energy*, 2019, **65**.