

Supplementary Information

Cube-shaped hierarchical $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ with enhanced growth of nanocrystal planes as high-performance cathode materials for lithium-ion batteries

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Preparation of NCM-bulk: bulk $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ (NCM-bulk) was synthesized by the co-precipitation method reported in the literature.¹ The annealing process was carried out at 850 °C for 12 h in air.

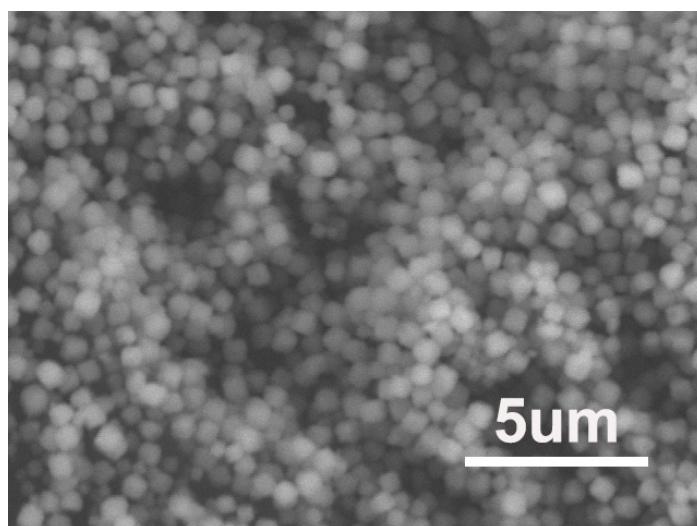


Fig. S1 SEM image of MnCO_3 cubes.

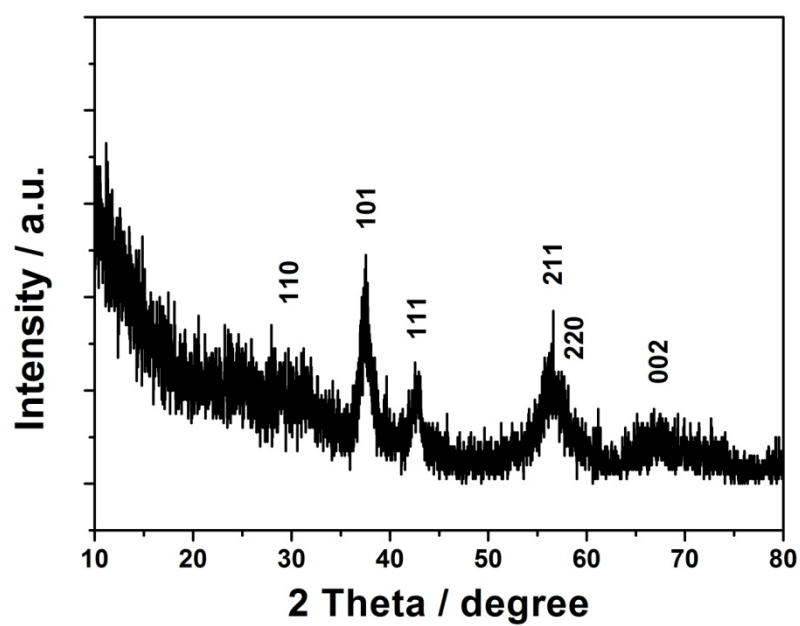


Fig. S2 XRD pattern of MnO_2 cubes (JCPDS Card No.: 24-0735).

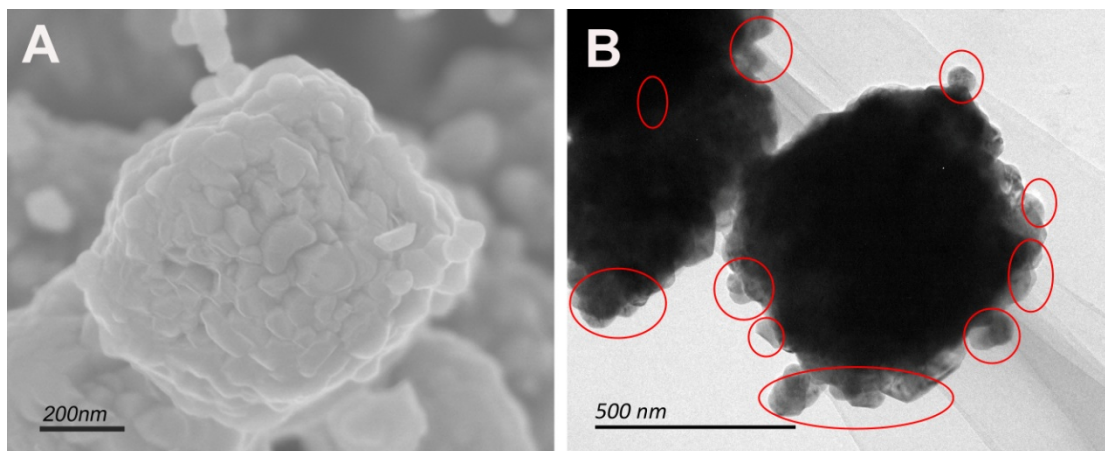


Fig. S3 (A) SEM image of the CH-NCM; (B) TEM image of the CH-NCM.

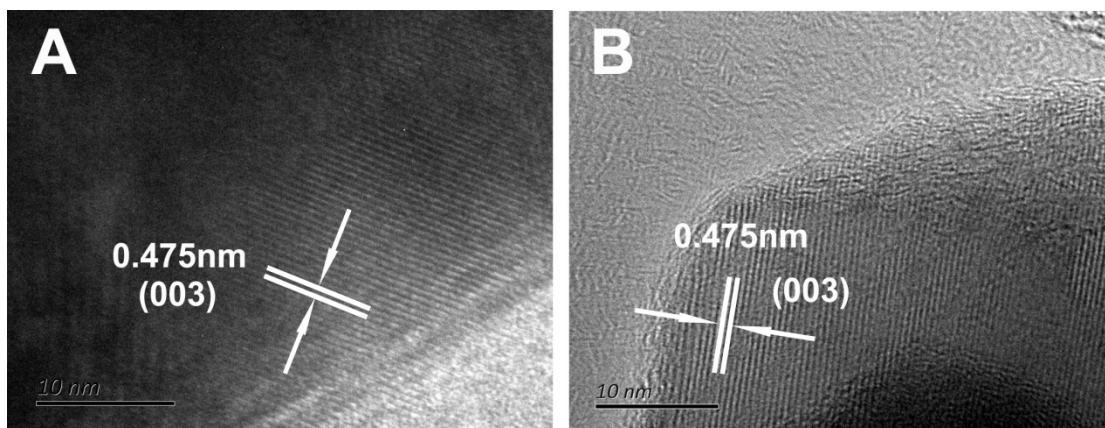


Fig. S4 (A) and (B) HR-TEM image of the CH-NCM.

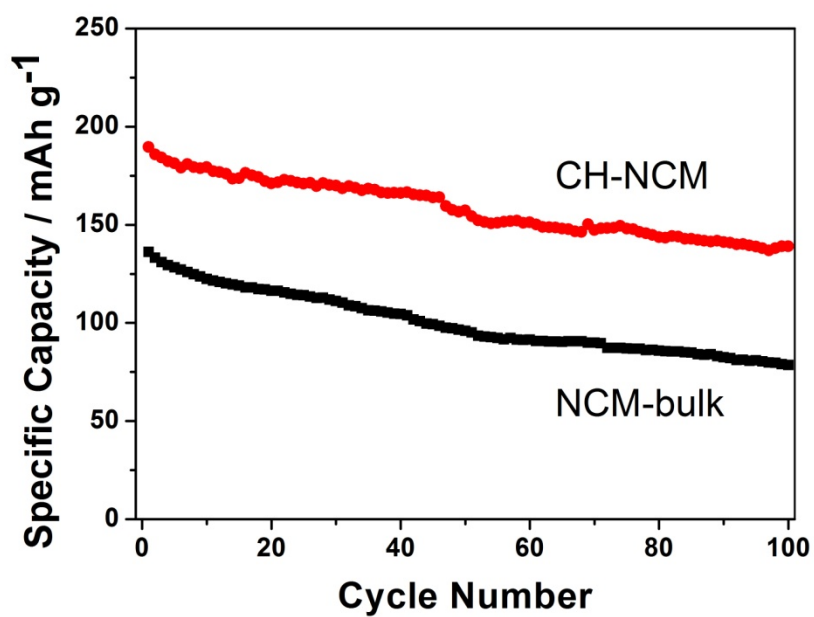


Fig. S5 Comparative cycling performances of CH-NCM and NCM-bulk at 2 C.

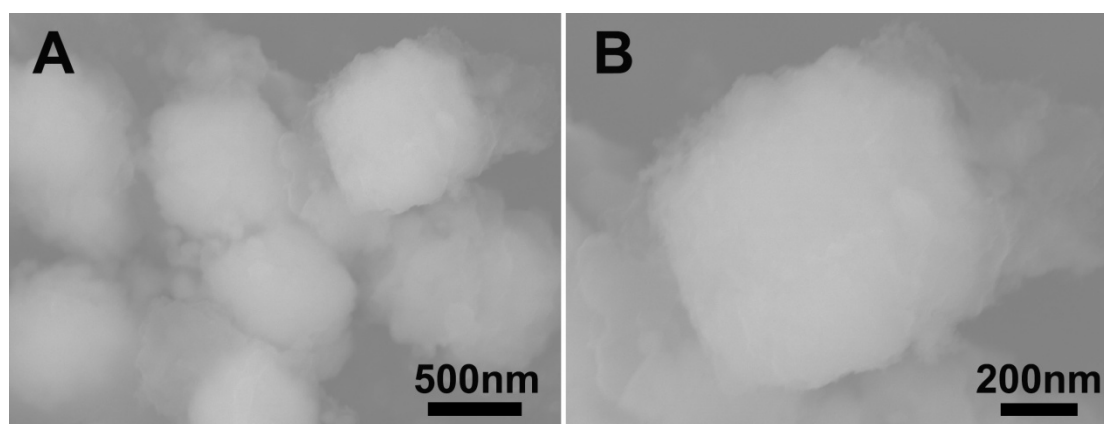


Fig. S6 The morphology of CH-NCM cathodes after 100 charge and discharge cycles at 0.1 C (A) at low magnifications (B) at high magnifications.

Table S1. Electrochemical performances for several advanced $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ cathode materials

Structure	Voltage range (V)	Capacity (mAh g^{-1})	Reference
Hierarchical nanocube	2.5-4.5	220.9 (0.1C)	This work
		211.4 (1C)	
		171.7 (5C)	
		144.5 (10C)	
Hollow microsphere	2.5-4.5	212 (0.1C)	5
		204.8 (1C)	
		155.7 (5C)	
		135.9 (10C)	
microrod	2.8-4.3	163.3 (0.1C)	6
		126.9 (10C)	
Hollow microsphere	2.5-4.6	187.1 (0.1C)	9
		145.3 (5C)	
Hierarchical microsphere	2.5-4.5	171 (0.1C)	10
		120 (10C)	
Nanoplate	2.5-4.5	207.6 (0.1C)	11
		160.5 (5C)	
		149.3 (7C)	
Ordered crystal	2.5-4.4	197.9 (0.1C)	12
		120.9 (8C)	
nanoflower	2.7-4.3	161 (0.2C)	13
		126 (20C)	
Hierarchical microsphere	2.5-4.4	196 (0.1C)	14
		78 (3C)	

References

1. J. X. Zhu, T. Vo, D. S. Li, R. Lu, N. Kinsinger, L. Xiong, Y. S. Yan and D. Kisailus, *Cryst. Growth Des.*, 2012, 12, 1118.