Electronic Supplementary Material (ESI) for RSC Advances.


# Supporting Information for

## Self-generated Hollow $NaTi_2(PO_4)_3$ Nanocubes Decorated with Graphene as a Large Capacity and Long Lifetime Anode for Sodium-ion Batteries

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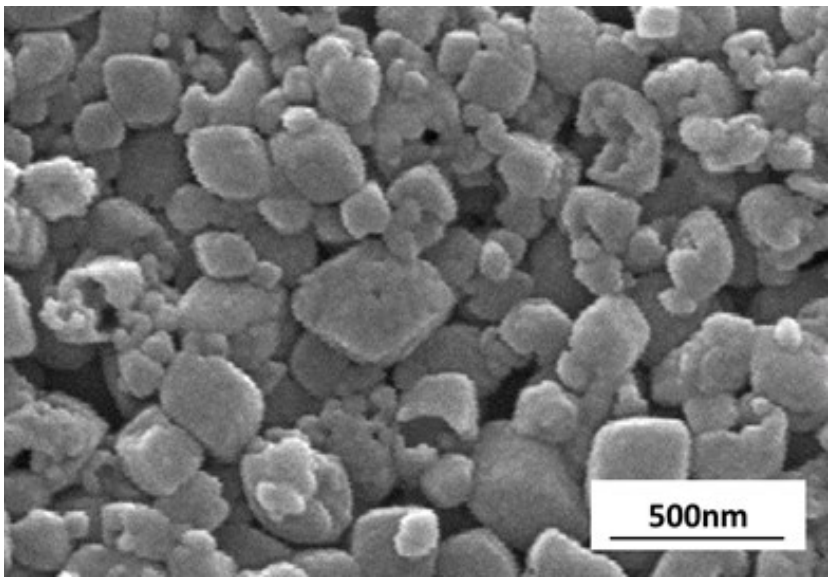


**Fig.S1. SEM images of pure $NaTi_2(PO_4)_3$ with hydrothermal time of 9hs.**

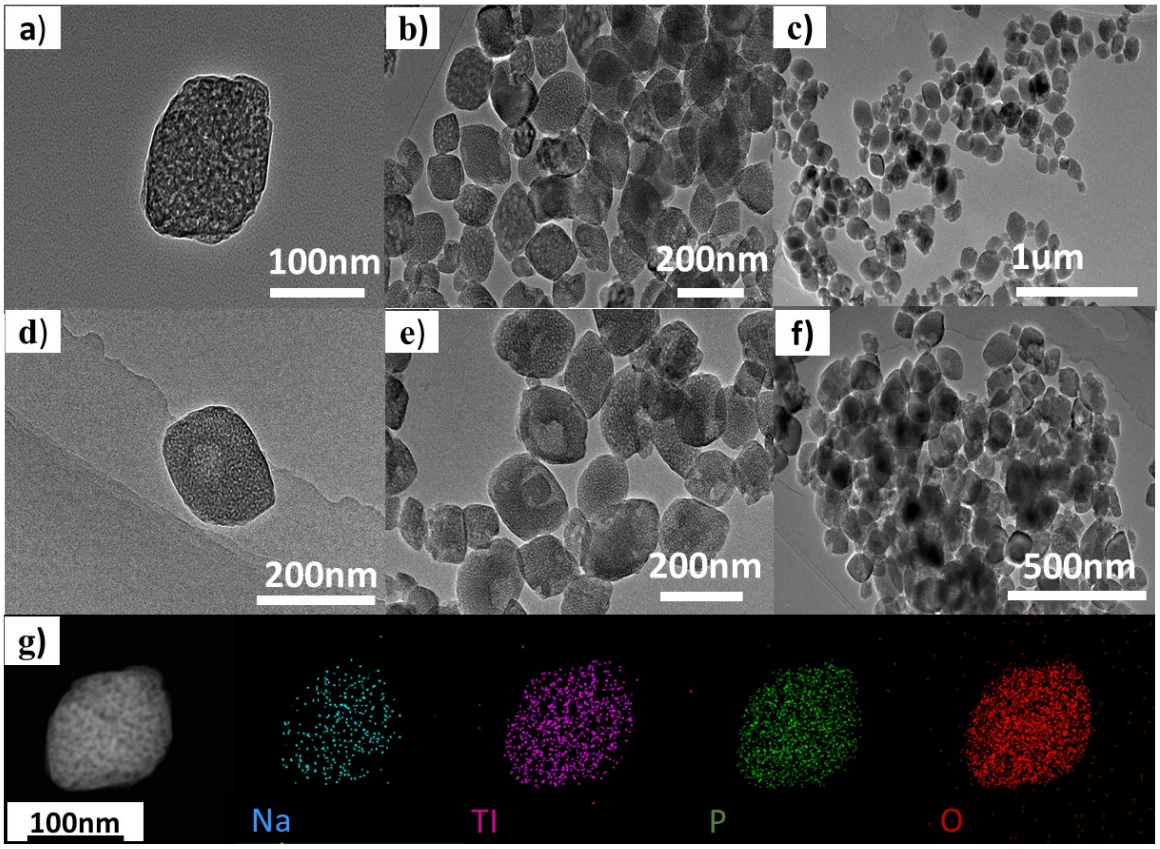


**Fig.S2.** a, b, c) TEM images of $NaTi_2(PO_4)_3$ 1h; d, e, f) showing the $NaTi_2(PO_4)_3$ 6h; g)TEM image of $NaTi_2(PO_4)_3$ 1h and the corresponding EDX mapping of Na (blue), Ti(purlish red), P (green), O (red).

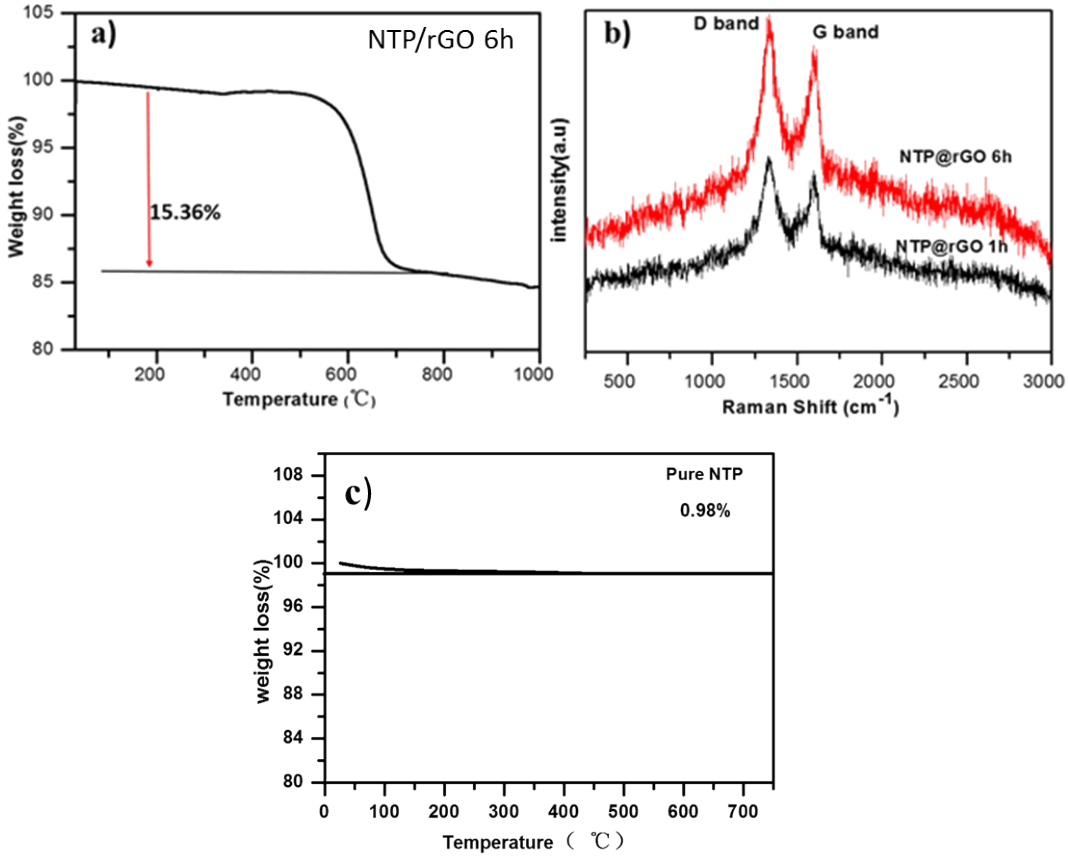


**Fig. S3.** a) The TG curve of the $NaTi_2(PO_4)_3$@rGO 6h sample ; b) Raman spectra of the $NaTi_2(PO_4)_3$/rGO 1h and $NaTi_2(PO_4)_3$/rGO 6h composites; c) The TG curve of the pure $NaTi_2(PO_4)_3$ sample.

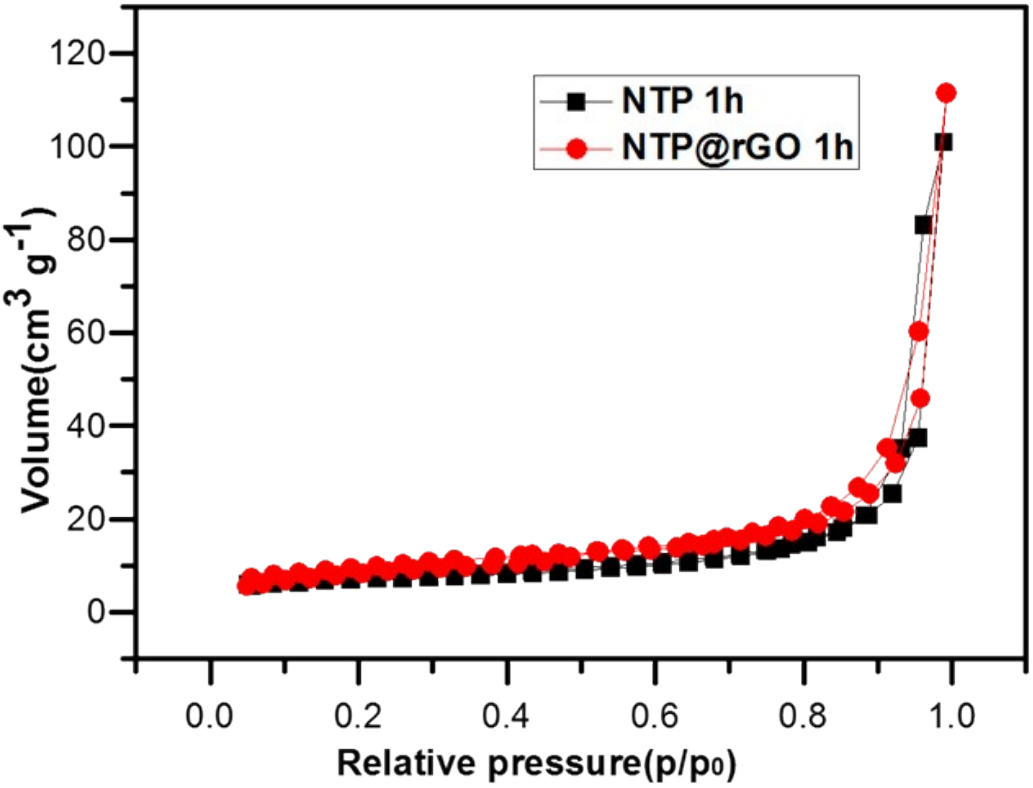


**Fig.S4.** a) $N_2$ absorption–desorption isotherms of the $NaTi_2(PO_4)_3$ 1h and $NaTi_2(PO_4)_3$/rGO 1h.

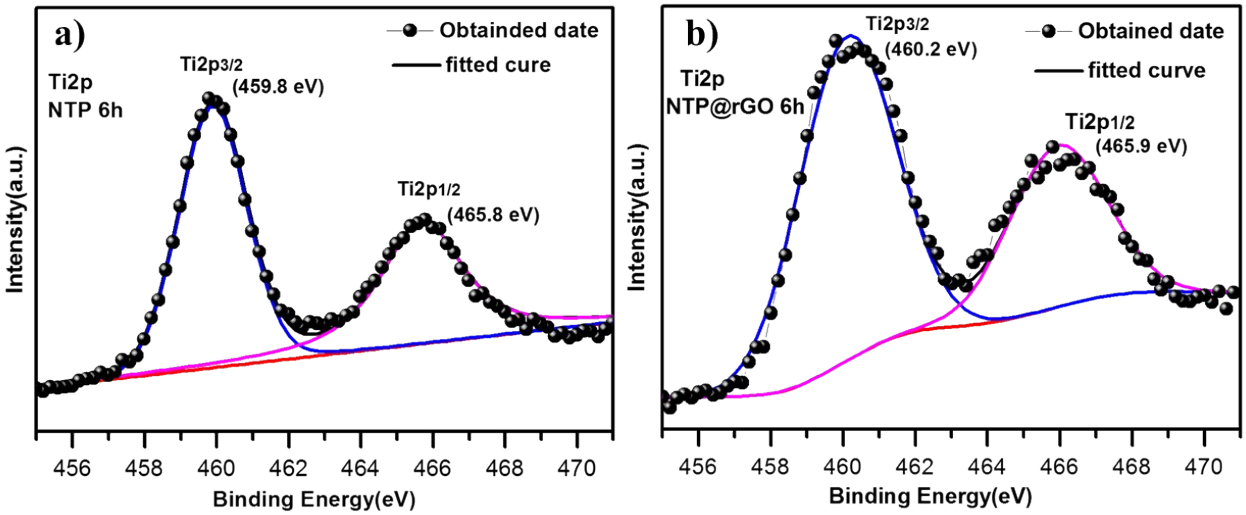


**Fig.S5.** a) XPS survey spectra of the $NaTi_2(PO_4)_3$ 6h and $NaTi_2(PO_4)_3$@rGO 6h; a, b) Deconvoluted Ti2p peaks of the $NaTi_2(PO_4)_3$ 6h and the $NaTi_2(PO_4)_3$@rGO 6h composite.

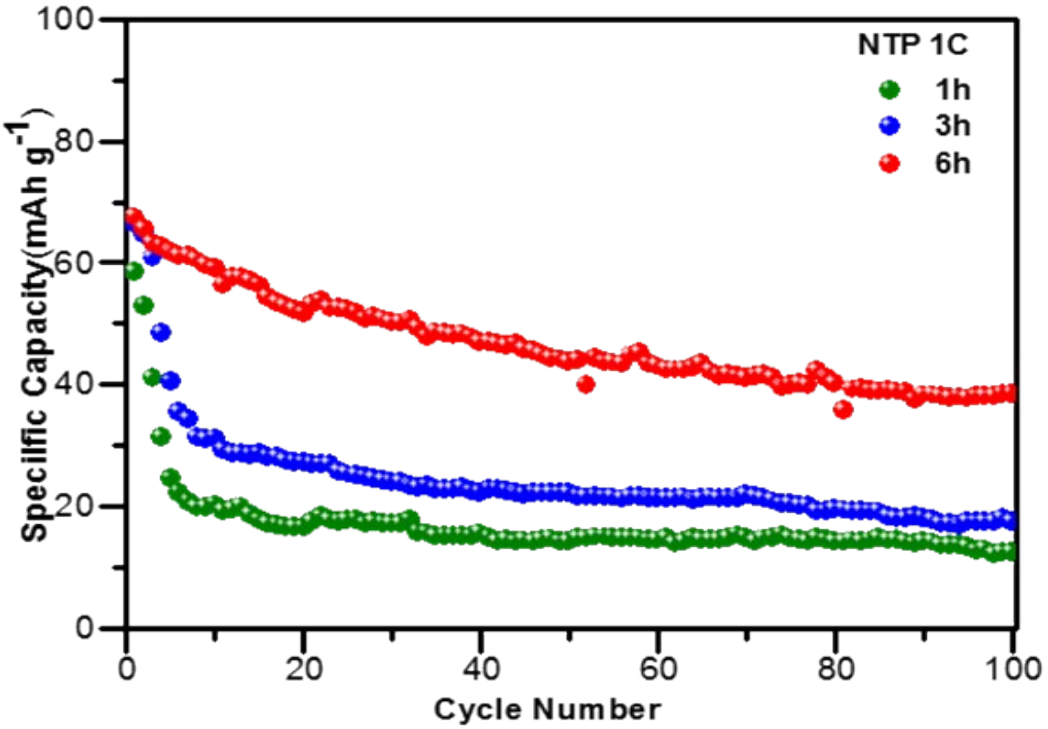


**Fig.S6.** Cycling performance at 1C of pure $NaTi_2(PO_4)_3$ prepared with hydrothermal times of 1h,3h, and 6h .

**Table S1.** Comparison of electrochemical performace of different NTP materials

| Electrode definition | Specific capacity ($mAh\ g^{-1}$) | Cycle performance | References |
|---|---|---|---|
| H-NTP NC@rGO | 128mAh $g^{-1}$at 1C | 120mAh $g^{-1}$after 150 cycles at 1C | **This work** |
| | 118 mAh $g^{-1}$ at 3C | 103mAh $g^{-1}$ after 500 cycles at 3C | |
| High rate performance of NTP@rGO | 112 mAh $g^{-1}$ at 1C | 100 mAh $g^{-1}$ after 150 cycles at 1C | S1 |
| Porous NTP@rGO | 138 mAh $g^{-1}$ at 1C | 101 mAh $g^{-1}$ after 200 cycles at 1C | S2 |
| Self-assembled wafer-like porousNTP decorated with hierarchical carbon | 114mAh $g^{-1}$ at 2C | 92 mAh $g^{-1}$ after 300 cycles at 2C | S3 |
| Facile solvothermal synthesis of NaTi2(PO4)3/C porous | 85mAh $g^{-1}$ at 10C | 70mAh $g^{-1}$ after 120 cycles at 10C | S4 |
| NTP Nanocubes with Synergistic Coating of Carbon and Rutile $TiO_2$ | 86 mAh $g^{-1}$ at 5C | 77.8 mAh $g^{-1}$ after 2000 cycles at 5C | S5 |


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