

Author's Accepted Manuscript

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PII: S2211-2855(18)30545-7
DOI: <https://doi.org/10.1016/j.nanoen.2018.07.057>
Reference: NANOEN2924

To appear in: *Nano Energy*

Received date: 10 June 2018
Revised date: 21 July 2018
Accepted date: 25 July 2018

Cite this article as: Haojie Zhu, Xing Cheng, Haoxiang Yu, Wuquan Ye, Na Peng, Runtian Zheng, Tingting Liu, Miao Shui and Jie Shu, $K_6Nb_{10.8}O_{30}$ Groove Nanobelts as High Performance Lithium-Ion Battery Anode towards Long-Life Energy Storage, *Nano Energy*, <https://doi.org/10.1016/j.nanoen.2018.07.057>

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$K_6Nb_{10.8}O_{30}$ Groove Nanobelts as High Performance Lithium-Ion Battery Anode towards Long-Life Energy Storage

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Abstract

Owing to the multiple redox couples of Nb^{5+}/Nb^{4+} and Nb^{4+}/Nb^{3+} , Nb-based compounds have attracted great attention to be promising high-capacity anode materials for rechargeable batteries. Here, $K_6Nb_{10.8}O_{30}$ groove nanobelts (GNB) are synthesized through heat-treating the adjustable electrospun potassium niobate nanofibers, thereupon the structural change in the lithiation and delithiation is evidently imaged via *in situ* transmission electron microscopy (TEM). From *in situ* observations, the $K_6Nb_{10.8}O_{30}$ GNB, in virtue of its stability, is ascertained to be adopted as anode material in lithium-ion batteries (LIBs). Evaluated as lithium storage host, GNB outstrip nanowires (NW) in cyclicality and in reversible capacity. Even after 1000 cycles, the retention capacity of $K_6Nb_{10.8}O_{30}$ GNB is as high as 69 %. Furthermore, the lithium-storage mechanism is also investigated via *in situ* X-ray

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