Supplementary Information

High-Areal-Capacity Lithium Storage of Kirkendall Effect-driven Hollow Hierarchical NiS_x Nanoarchitecture

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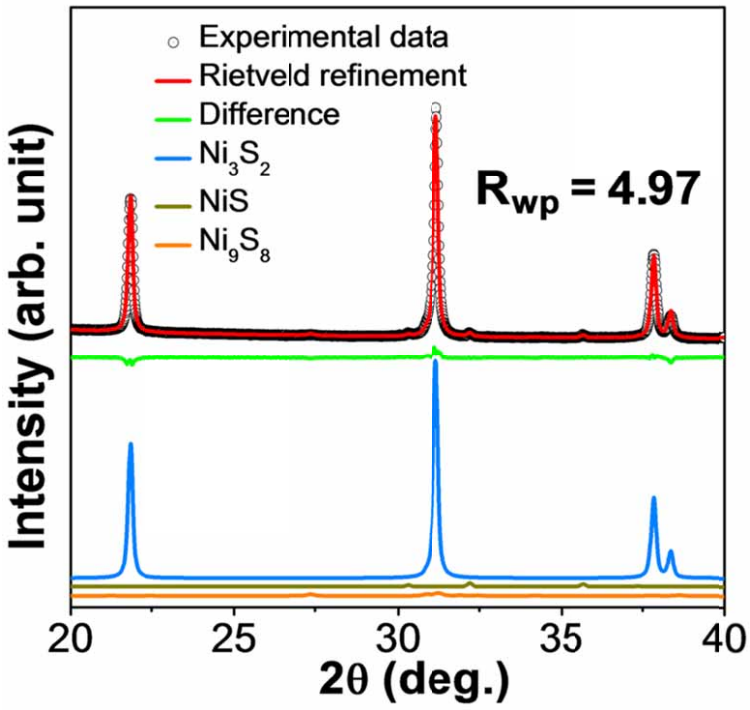

Figure S1. Rietveld refinement results of the annealed 3-D NiS_x electrodes. The Ni_3S_2, Ni_9S_8, and NiS phases occupy 93.39, 5.74 and 0.87 wt.% of the total phase, respectively.

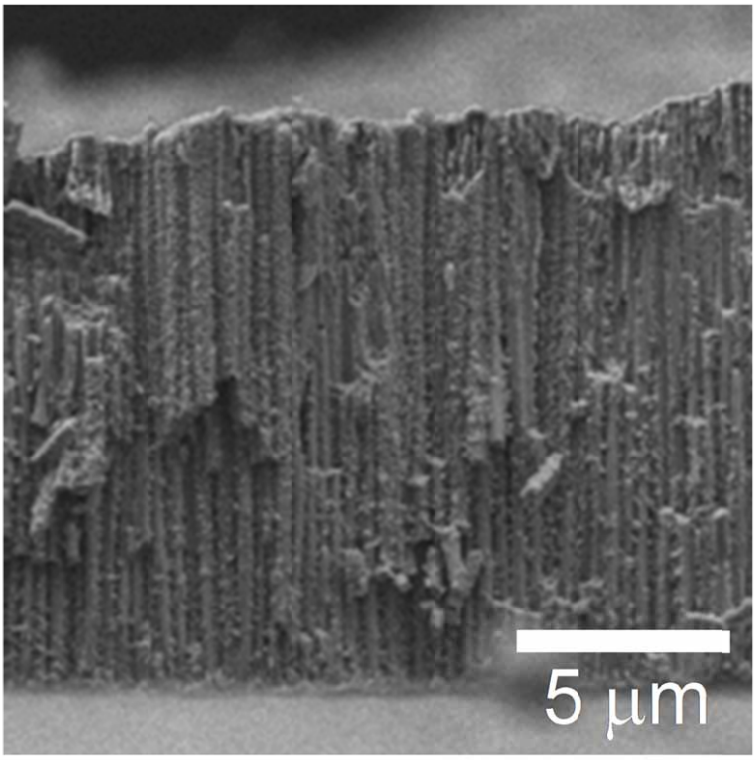

Figure S2. A cross-view FESEM image of the 3-D NiS_x electrodes.

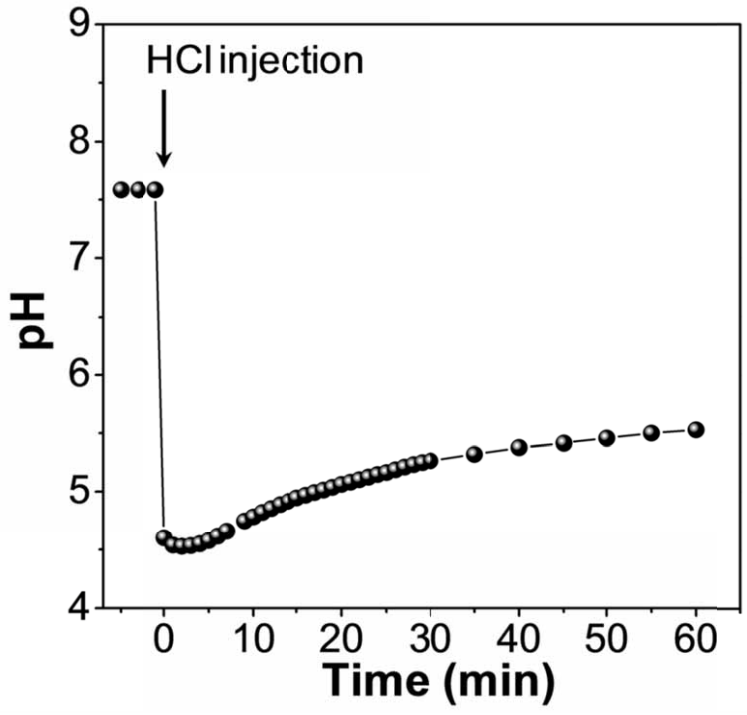

Figure S3. The plot of pH value versus reaction time.

Table S1. A summary of literature results of 3-D lithium ion microbattery electrodes.

Material	Areal capacity/ mA h cm^{-2}	Rate/ mA cm^{-2}	References
Hollow NiS_x nanoarchitecture	1.5	0.5	This work
Porous Ni_3S_2 film grown on Ni foam	1.53	0.4	1
CuS-coated μ-channel silicon substrate	1.015	0.12	2
TiO_xS_y nanotubes	0.225	0.07	3
Polyaniline-coated Au nanorods	0.032	0.04	4
V_2O_5-coated MWCNT sponge	0.818	1.1	5
$LiFePO_4$-coated porous carbon foam	1.72	0.1	6
$LiCoO_2$-deposited Al nanorods	0.11	C/5	7

References

1. N. Feng, D. Hu, P. Wang, X. Sun, X. Li and D. He, *Phys. Chem. Chem. Phys.*, 2013, **15**, 9924–9930.
2. H. Mazor, D. Golodnitsky, L. Burstein and E. Peled, *Electrochem. Solid-State Lett.*, 2009, **12**, A232–A235.
3. N. A. Kyerematen, N. Plylahan, A. C. S. dos Santos, L. V. Taveira, L. F. P. Dick and T. Djenizian, *Chem. Commun.*, 2013, **49**, 4205–4207.
4. S. R. Gowda, A. L. M. Reddy, X. Zhan, H. R. Jafry and P. M. Ajayan, *Nano Lett.* 2012, **12**, 1198–1202.
5. X. Chen, H. Zhu, Y.-C. Chen, Y. Shang, A. Cao, L. Hu and G. W. Rubloff, *ACS Nano*, 2012, **6**, 7948–7955.
6. H. D. Asfaw, M. R. Roberts, C.-W. Tai, R. Younesi, M. Valvo, L. Nyholm and K. Edstrom, *Nanoscale*, 2014, **6**, 8804–8813.
7. M. M. Shaijumon, E. Perre, B. Daffos, P.-L. Taberna, J.-M. Tarascon and P. Simon, *Adv. Mater.*, 2010, **22**, 4978–4981.