

Crystalline In-Sb-S Framework for Highly-Performed Lithium/Sodium Storage

Lina Nie,^{abc} Xie Jian,^{bc} Guangfeng Liu,^b Shiji Hao,^b Zhichuan Jason Xu,^b Rong Xu,^c Qichun Zhang^{*bd}

Supporting Information

Table S1. Crystallographic data and structure refinement for IAS

	IAS
Chemical formula	C ₁₂ N ₃ H ₁₂ InSb ₂ S ₅
Formula mass	716.87
Crystal system	Monoclinic
Space group	<i>P</i> 2 ₁ / <i>m</i>
<i>a</i> (Å)	3.8688(12)
<i>b</i> (Å)	18.756(6)
<i>c</i> (Å)	12.443(4)
α (deg)	90.00
β (deg)	90.819(4)
γ (deg)	90.00
<i>V</i> (Å ³)	902.8(5)
<i>T</i> /K	100(2)
<i>Z</i>	2
<i>D</i> _{cal} (g/cm ³)	2.637
Theta (deg)	1.964 - 26.996
<i>R</i> (int)	0.0419
<i>R</i> ₁ [<i>I</i> > 2σ(<i>I</i>)]	0.0451
<i>wR</i> ₂ [<i>I</i> > 2σ(<i>I</i>)]	0.1189
GOF on <i>F</i> ²	1.092

$$^a R_1 = \sum ||F_o| - |F_c|| / \sum |F_o|, \quad ^b wR_2 = \left[\sum w(F_o^2 - F_c^2)^2 / \sum w(F_o^2)^2 \right]^{1/2}.$$

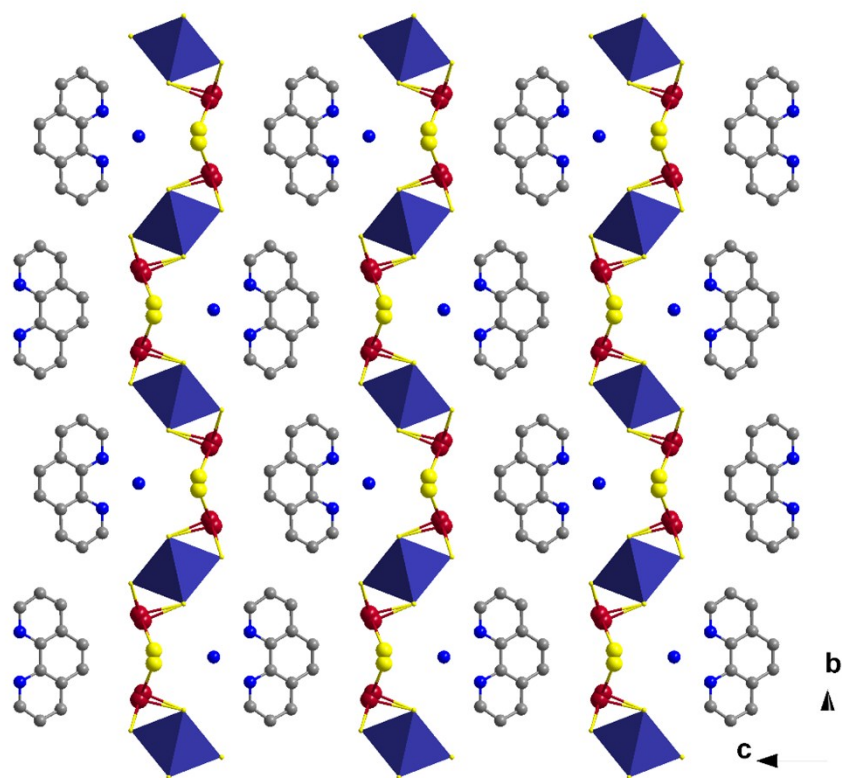


Figure S1. Stacking diagram of IAS viewed along a direction.

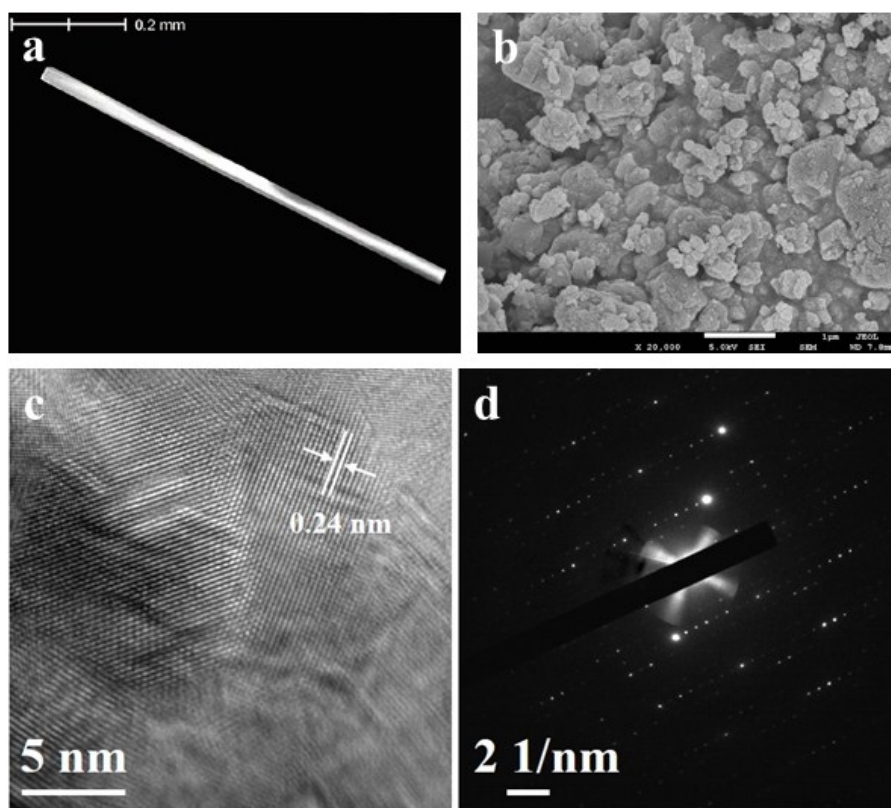


Figure S2. Characterization of IAS. SEM images (a) before grinding and (b) after grinding; (c) high-resolution TEM image; (d) SAED pattern.

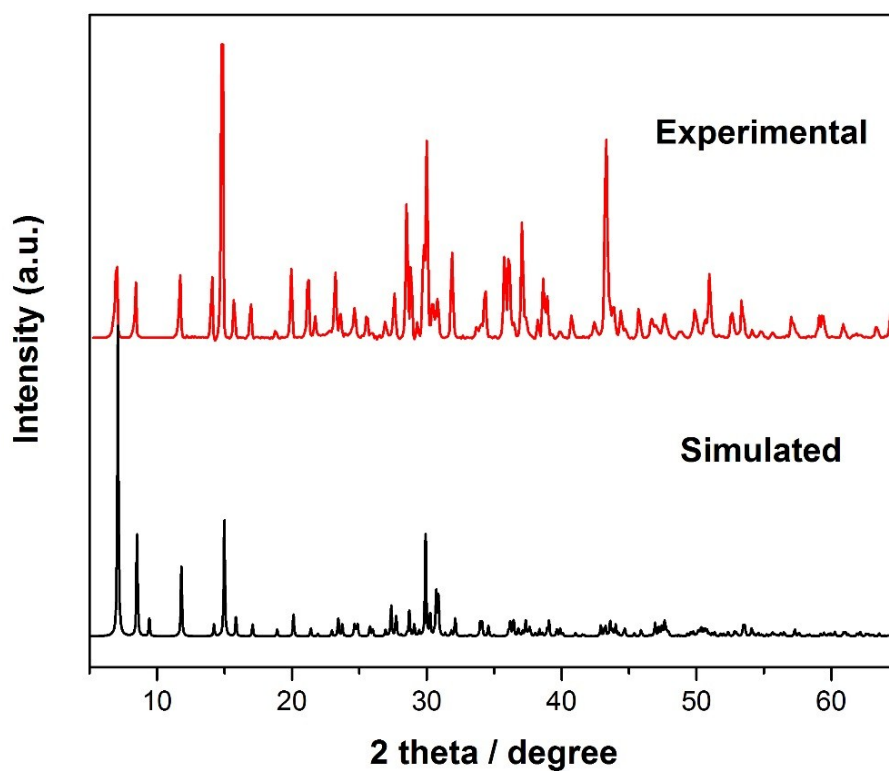


Figure S3. PXRD patterns of IAS. Red: experimental; black: simulated.

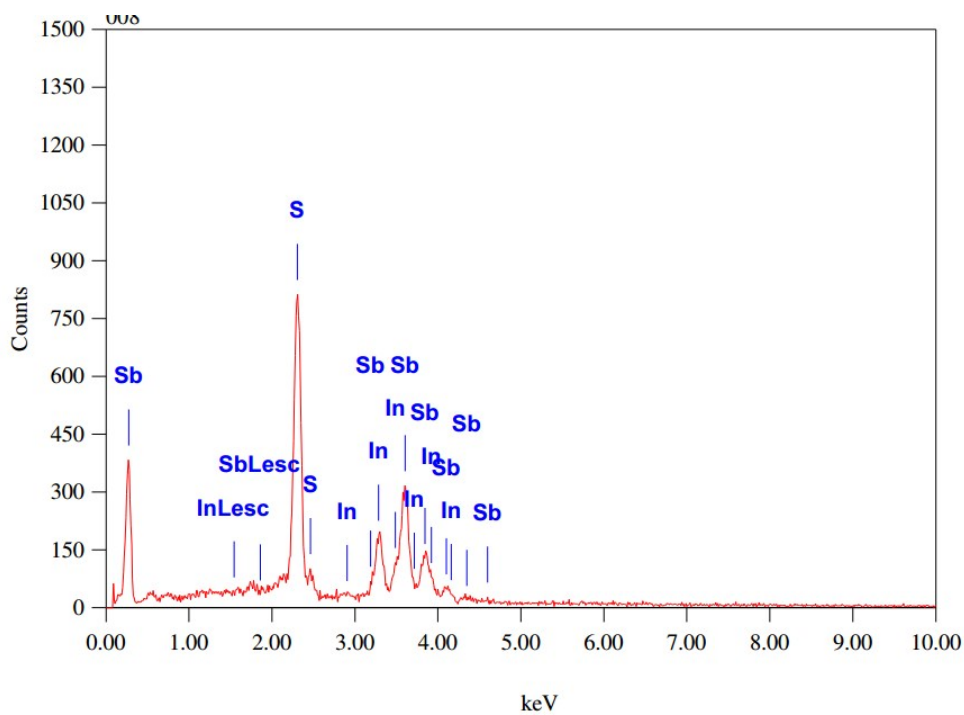


Figure S4. The energy dispersive X-ray spectroscopy (EDS) of IAS.

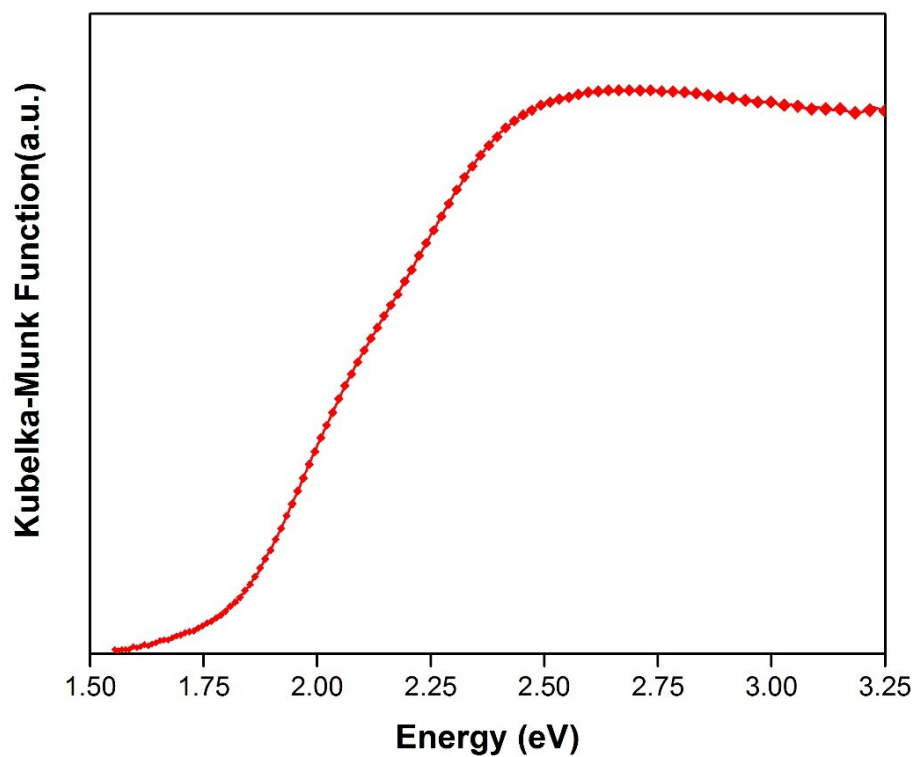


Figure S5. Solid-state optical absorption spectrum of IAS.

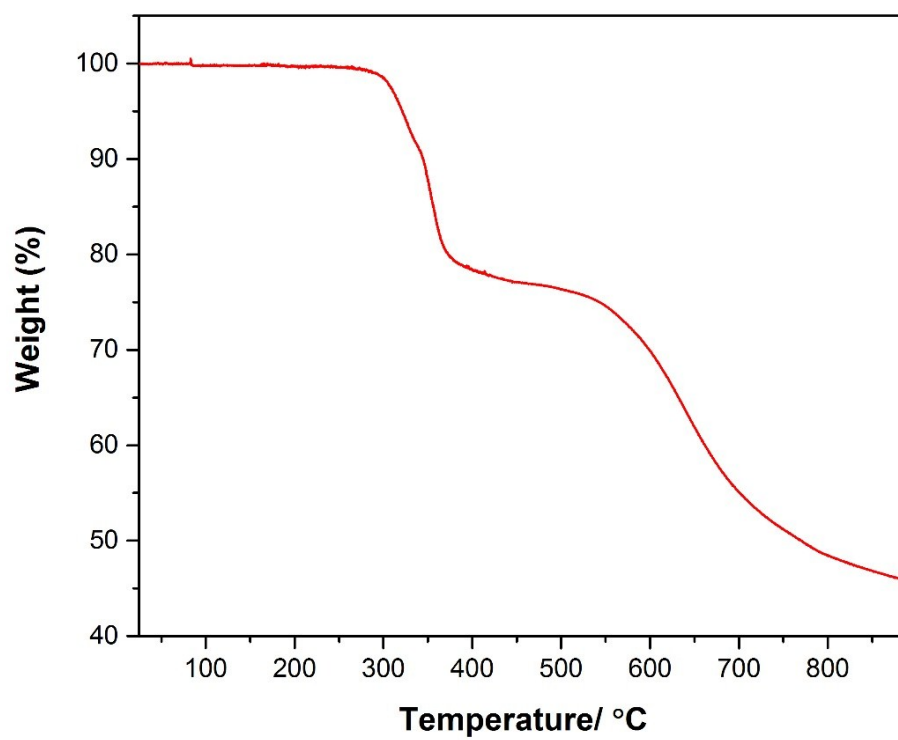


Figure S6. TGA curve for IAS.

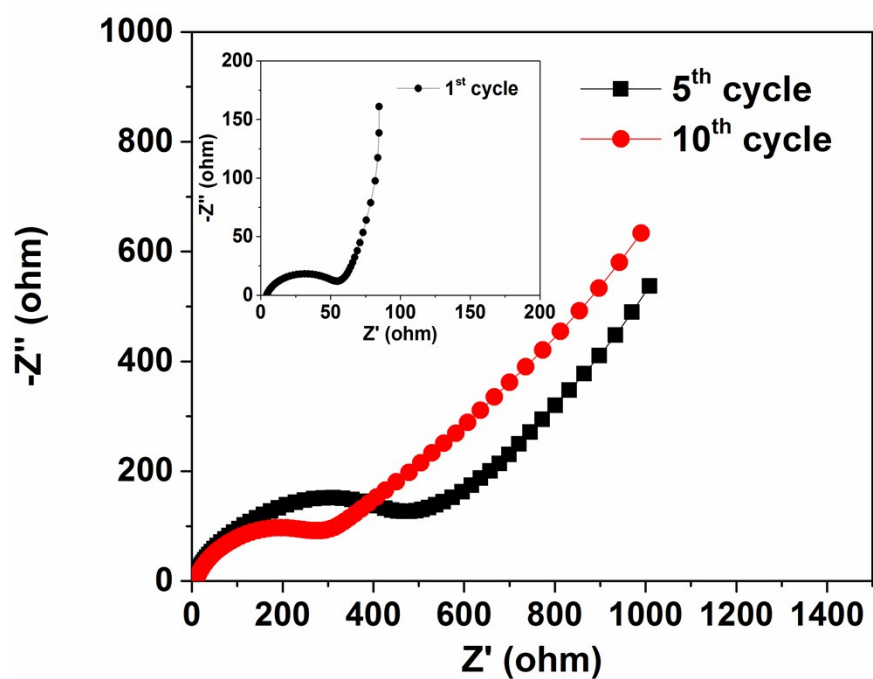


Figure S7. EIS profiles for IAS as an anode for LIBs.

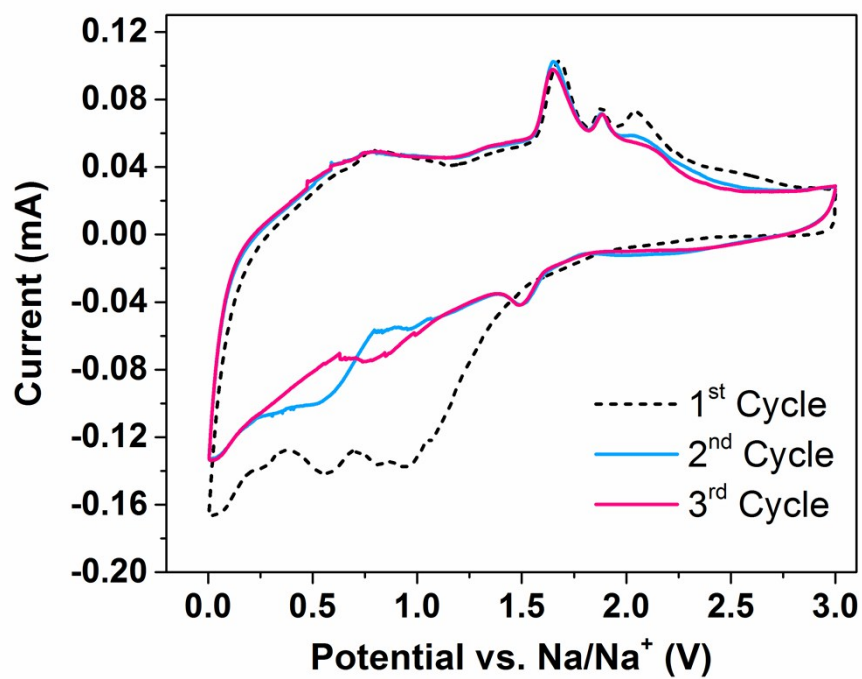


Figure S8. CV profiles of IAS assembled in a sodium battery during the initial three cycles at a scan rate of 0.2 mV/s.

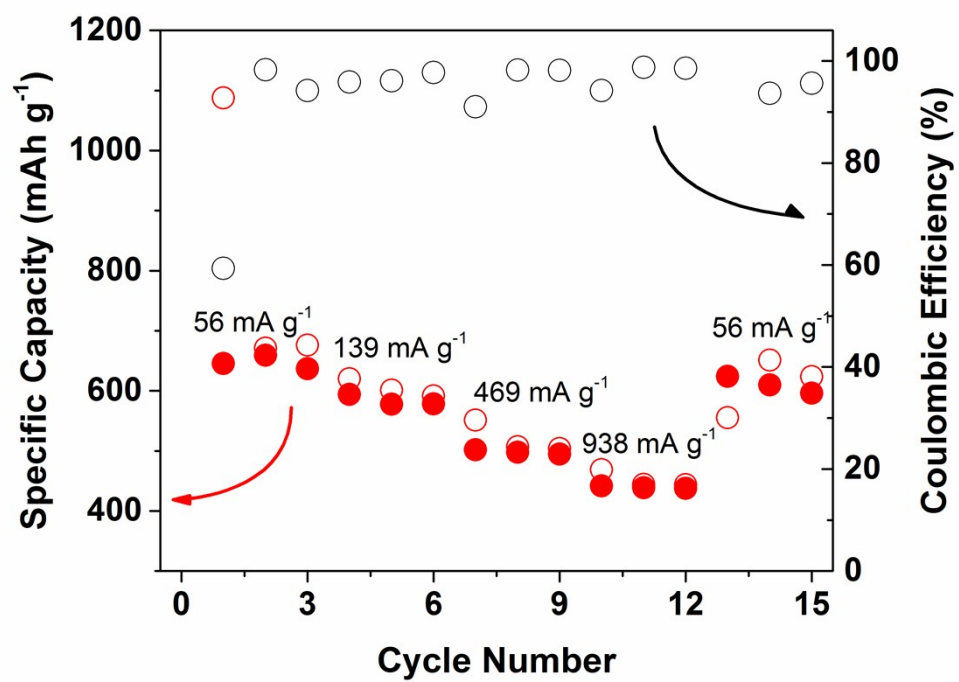


Figure S9. Rate performance of IAS assembled in a sodium battery.

References

1. L. Nie, Y. Zhang, K. Ye, J. Han, Y. Wang, G. Rakesh, Y. Li, R. Xu, Q. Yan and Q. Zhang, *J. Mater. Chem. A*, 2015, **3**, 19410-19416.
2. L. Nie, Y. Zhang, W.-W. Xiong, T.-T. Lim, R. Xu, Q. Yan and Q. Zhang, *Inorg. Chem. Front.*, 2016, **3**, 111-116.
3. Y. Du, Z. Yin, X. Rui, Z. Zeng, X.-J. Wu, J. Liu, Y. Zhu, J. Zhu, X. Huang and Q. Yan, *Nanoscale*, 2013, **5**, 1456-1459.
4. S. Ding, D. Zhang, J. S. Chen and X. W. D. Lou, *Nanoscale*, 2012, **4**, 95-98.
5. H. Liu, D. Su, G. Wang and S. Z. Qiao, *J. Mater. Chem.*, 2012, **22**, 17437-17440.
6. J.-t. Jang, S. Jeong, J.-w. Seo, M.-C. Kim, E. Sim, Y. Oh, S. Nam, B. Park and J. Cheon, *J. Am. Chem. Soc.*, 2011, **133**, 7636-7639.
7. C. S. Rout, B.-H. Kim, X. Xu, J. Yang, H. Y. Jeong, D. Odkhuu, N. Park, J. Cho and H. S. Shin, *J. Am. Chem. Soc.*, 2013, **135**, 8720-8725.
8. X. Xu, R. Cao, S. Jeong and J. Cho, *Nano Lett.*, 2012, **12**, 4988-4991.
9. H. Sun, G. Xin, T. Hu, M. Yu, D. Shao, X. Sun and J. Lian, *Nat. Commun.*, 2014, **5**, 4526-4533.