Electronic Supplementary Material (ESI) for Nanoscale.

A Comparative Study of Pomegranate Sb@C Yolk-Shell Microspheres as Li and Na-Ion Battery Anodes

Junhua Song[1,2], Dongdong Xiao[1], Haiping Jia[1], Guomin Zhu[1], Mark Engelhard[1], Biwei Xiao[1], Shuo Feng[2], Dongsheng Li[1], David Reed[1], Vincent L. Sprenkle[1], Yuehe Lin[2] and Xiaolin Li[1*]*

1. Pacific Northwest National Laboratory, 902 Battelle Boulevard Richland, WA, 99354, USA
2. School of Mechanical and Materials Engineering, Washington State University, Pullman, WA 99164, USA

Correspondence should be addressed to: yuehe.lin@wsu.edu; xiaolin.Li@pnnl.gov

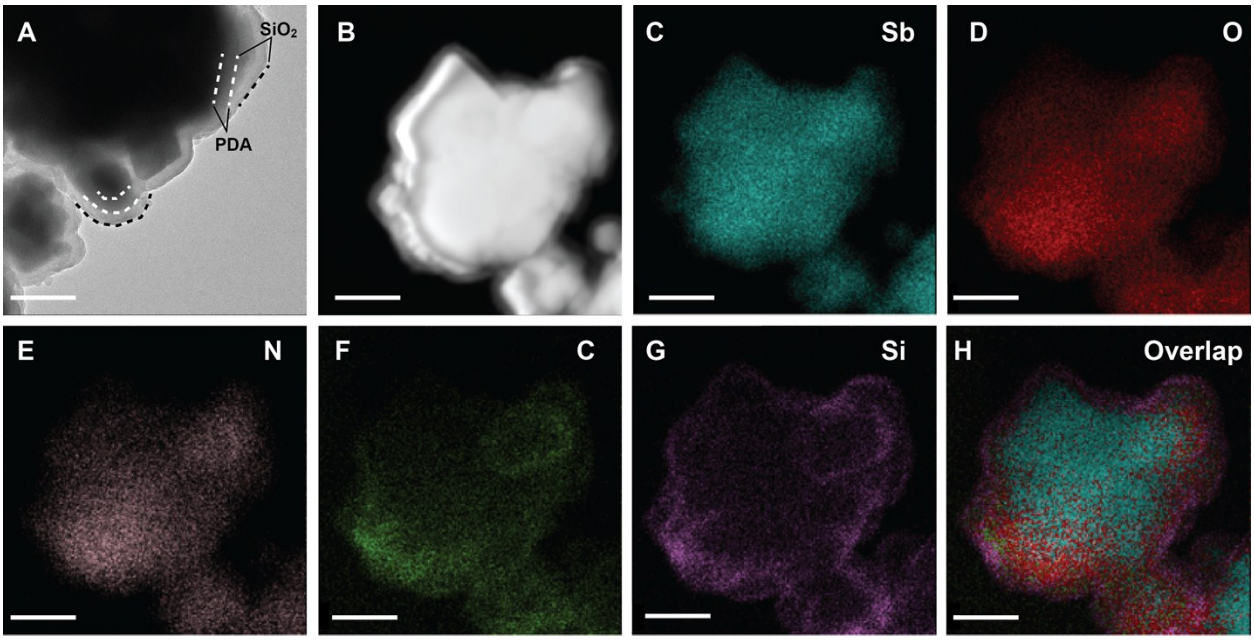

Figure S1. (A) A typical TEM image of the core-shell structured Sb_2O_3@PDA@SiO_2. (B) A typical STEM image of a Sb_2O_3@PDA@SiO_2 particle. (C) to (G) The corresponding elemental mapping of Sb, O, N, C and Si for the particle in (B). (H) Overlapped elemental mapping of (C) to (G). The scale bars are 200 nm.

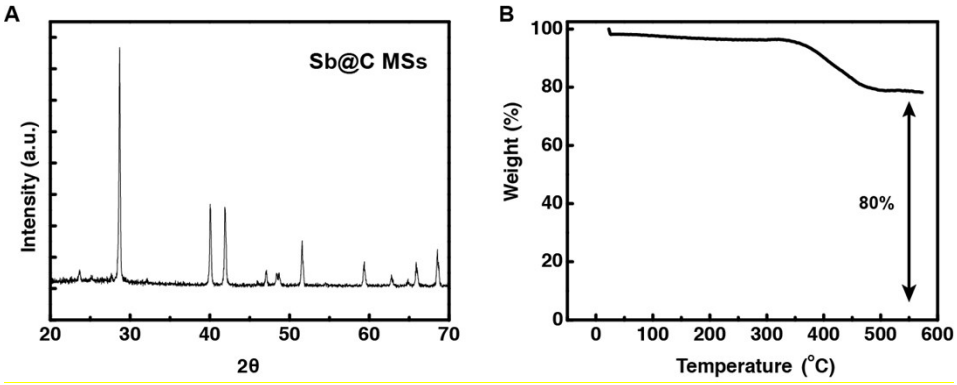

Figure S2. (A) A typical XRD pattern of Sb@C MSs. (B) TGA curve of Sb@C MSs.

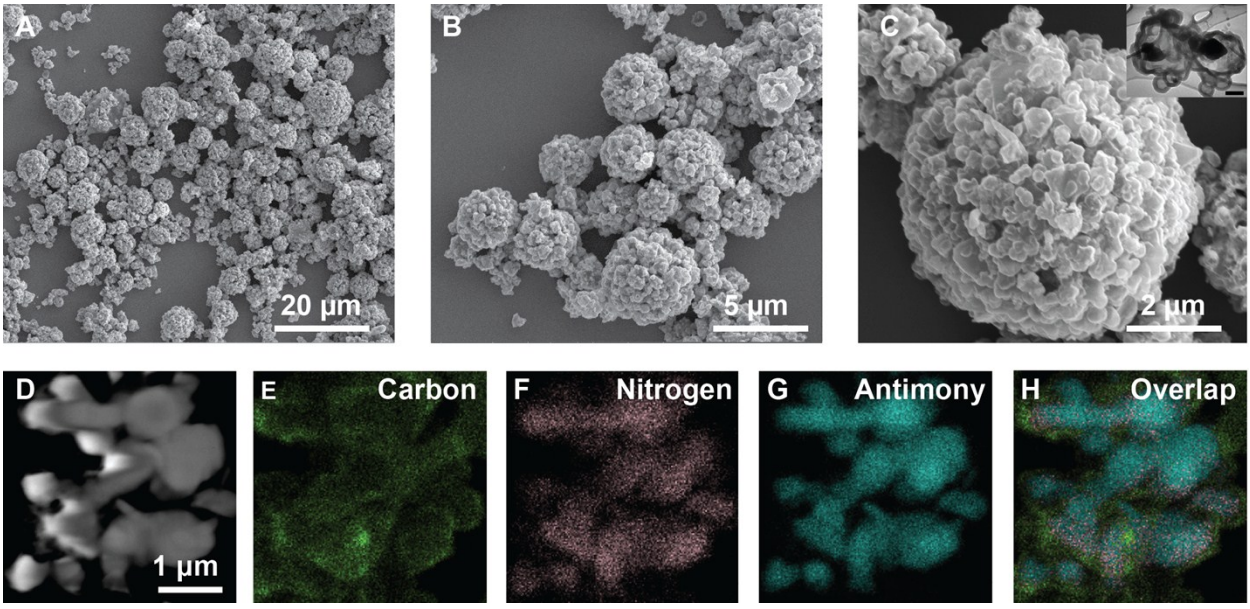

Figure S3. (A-C) Typical SEM images of Sb@C MSs; inset in C is a typical TEM image of yolk-shell Sb@C primary particle. The scale-bar is 200nm. (D) STEM image of a typical Sb@C MS. (E-G) The corresponding elemental mapping of carbon, nitrogen and antimony. (H) Overlapped elemental mapping of (E) to (G).

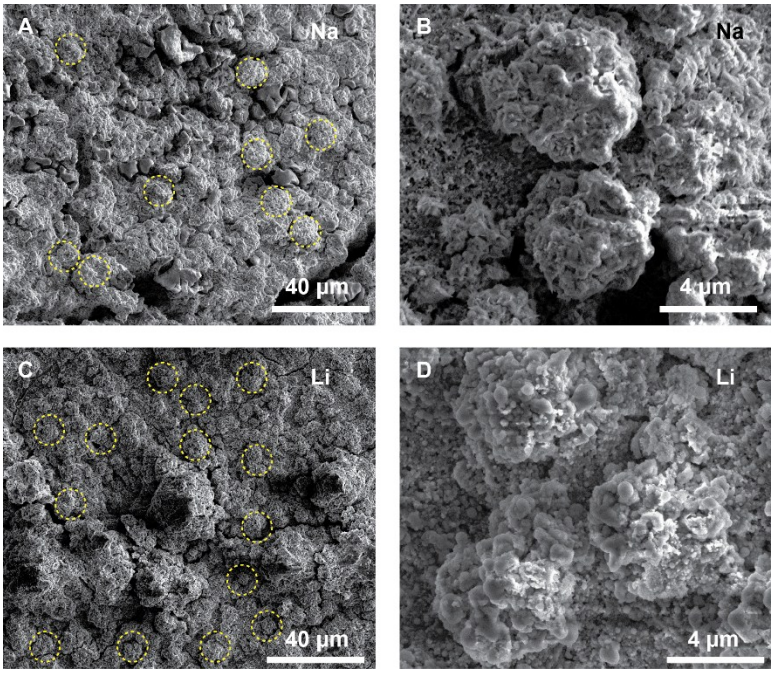

Figure S4. SEM images of Sb@C MS electrodes cycled in SIBs (A-B) and LIBs (C-D). Some Sb@C MSs are marked with dashed yellow circles.

Table S1. Impedance evolution of Sb@C MSs in LIBs and SIBs. R_{ohm} and R_{ct} represent ohmic and charge-transfer resistances, respectively.

	Fresh		**1st**		**5th**		**10th**		**50th**		**150th**		**Replacement**	
	Li	**Na**	**Li**	**Na**	**Li**	**Na**	**Li**	**Na**	**Li**	**Na**	**Li**	**Na**	**Li**	**Na**
R_{ohm} (Ω)	3.8	5.1	4.1	3.7	4.7	4.2	4.9	4.2	6.1	10.4	7.5	8.6	3.5	4.1
R_{ct} (Ω)	94	630	19	37	13	30	13	34	21	188	46	295	30	107

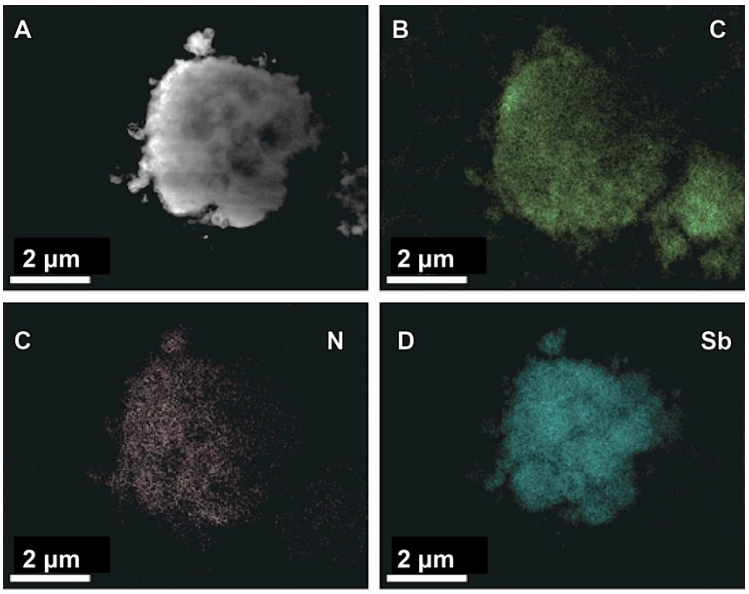

Figure S5. (A) STEM image of a Sb@C MS cycled in LIB and the corresponding elemental mapping of carbon (B), nitrogen (C) and Sb (D).

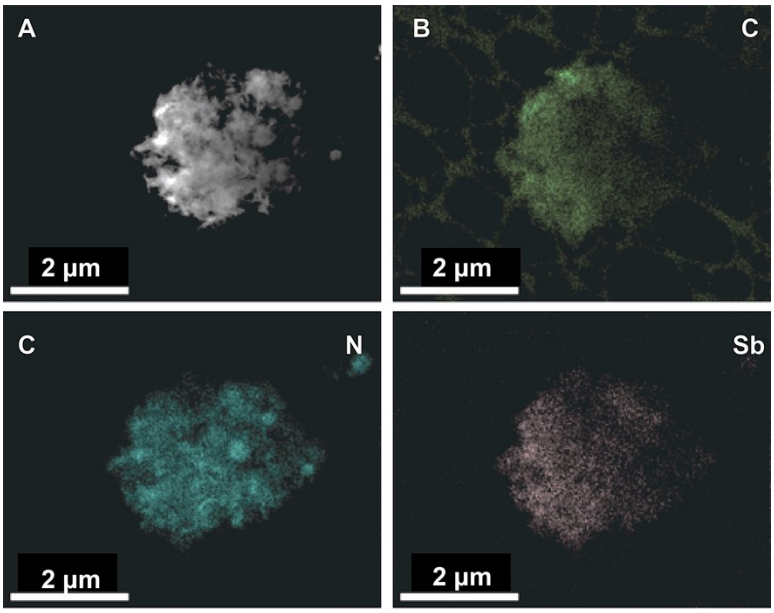

Figure S6. (A) STEM image of a Sb@C MS cycled in SIBs and the corresponding elemental mapping of carbon (B), nitrogen (C) and Sb (D).