

## **Supplementary Information**

# **Shape Evolution of Indium Sulfide Heterostructures via Carbon Nanotube Scrambling: Towards Reliable Sustainability and Mitigating Leakage Current in Supercapacitors**

Niraj Kumar<sup>1</sup>, Dhananjay Mishra<sup>1</sup>, Seungyeob Kim<sup>1</sup>, Krishnaiah Mokurala<sup>1</sup>, Rajneesh Kumar Mishra<sup>2\*</sup>, Junyoung Song<sup>1\*</sup>, and Sung Hun Jin<sup>1</sup>\*

<sup>1</sup> Department of Electronics Engineering, Incheon National University, Incheon 406-772, Republic of Korea.

<sup>2</sup> Department of Physics, Yeungnam University, Gyeongsan, Gyeongbuk, 3854, Republic of Korea;

\*Professor Sung Hun Jin, E-mail: shjin@inu.ac.kr, Fax: +82-32-835-0774, Tel: +82-32-835-8865.

\*Professor Junyoung Song, E-mail: jun.song@inu.ac.kr

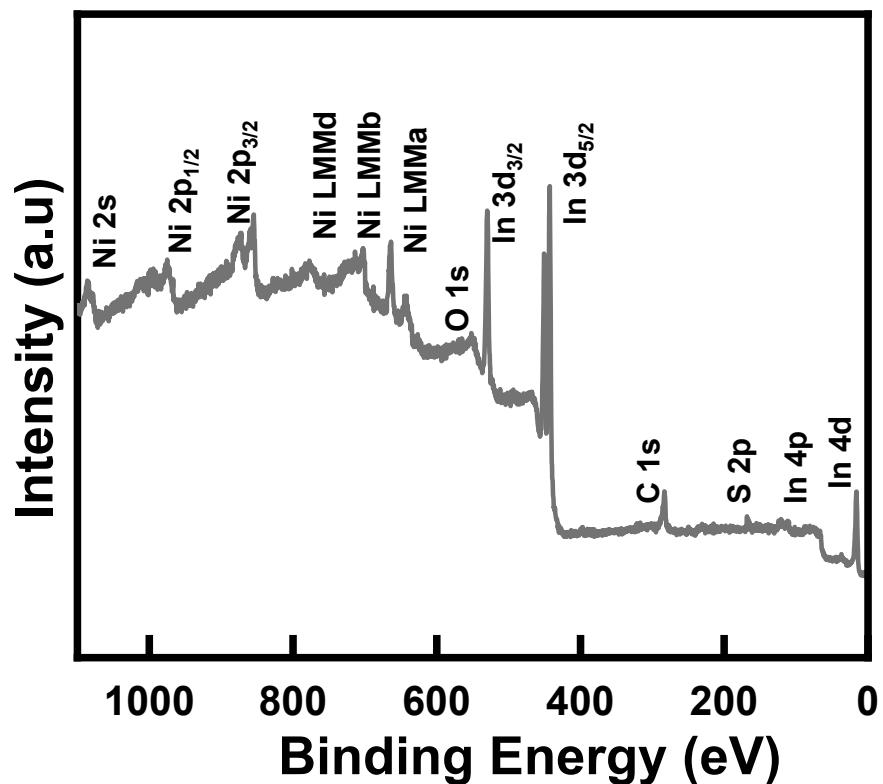
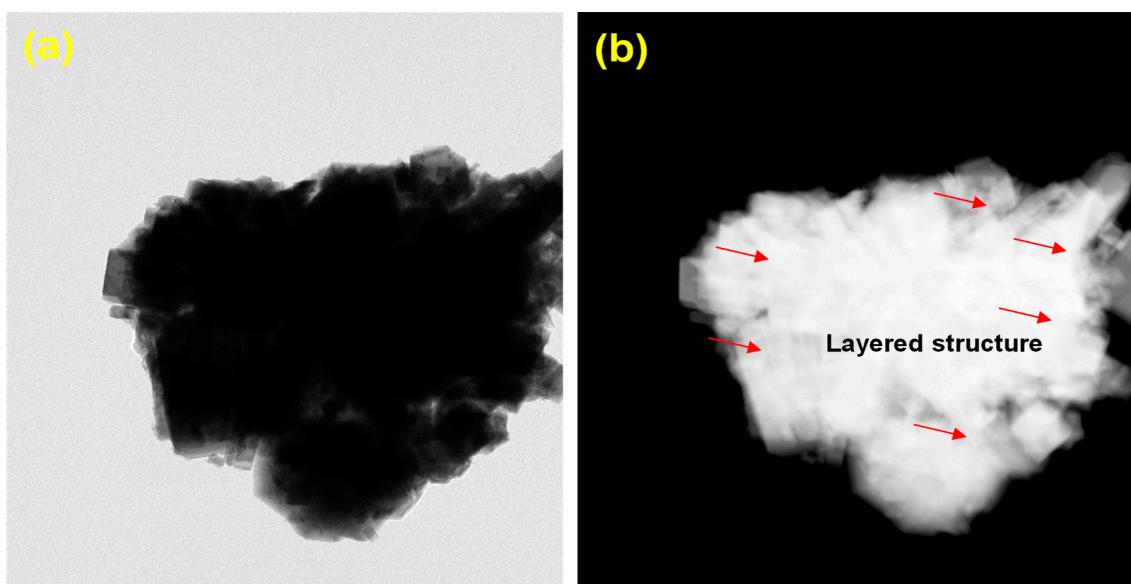
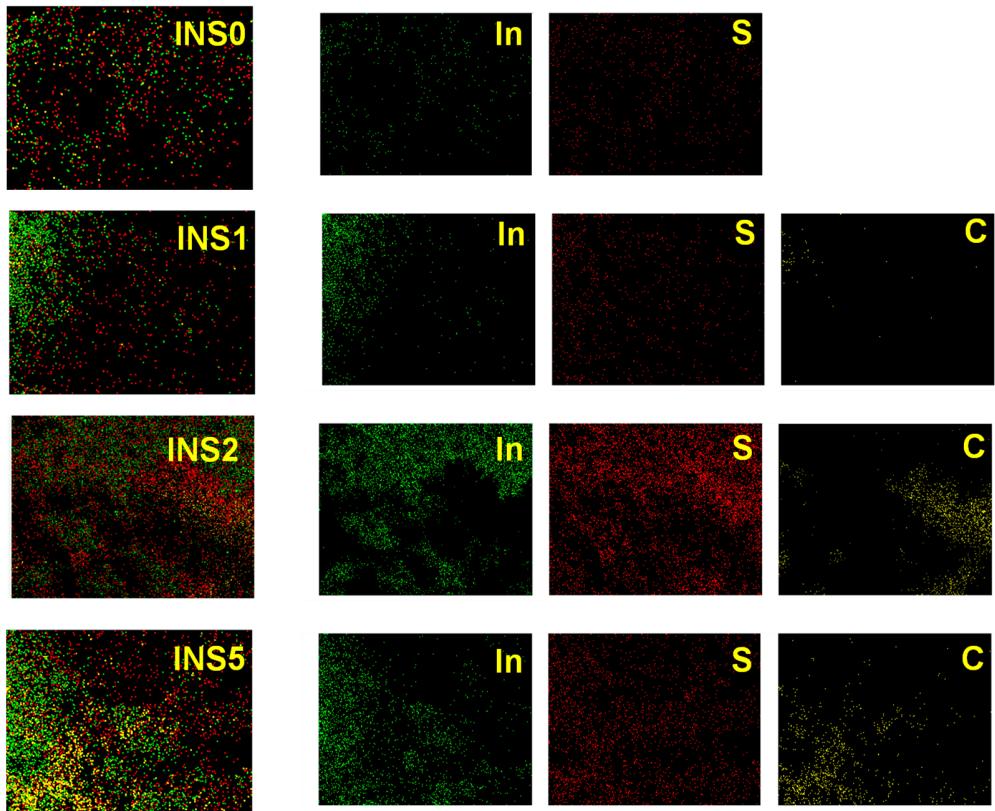


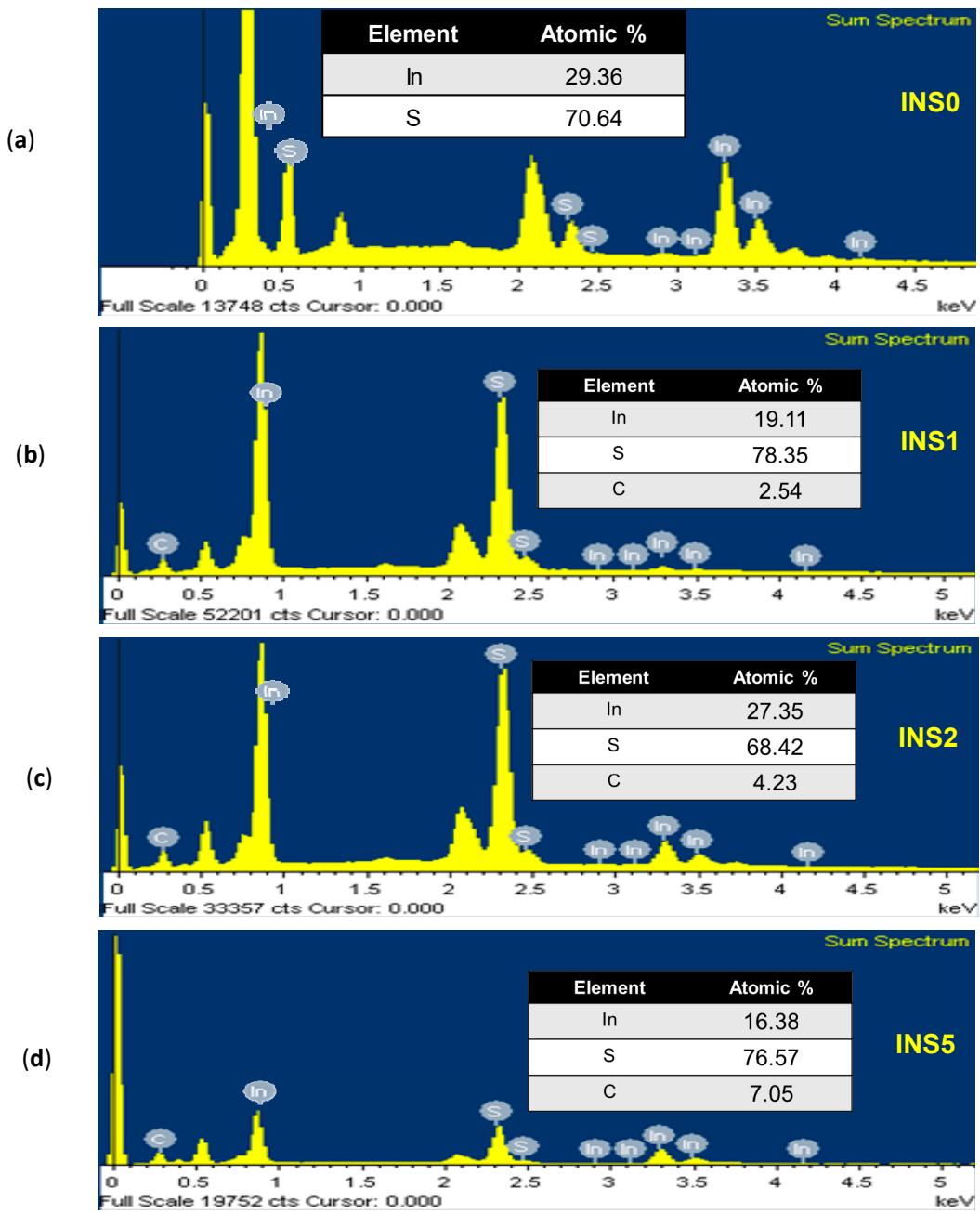
Figure S1. Full scan XPS spectra of INS1 sample.



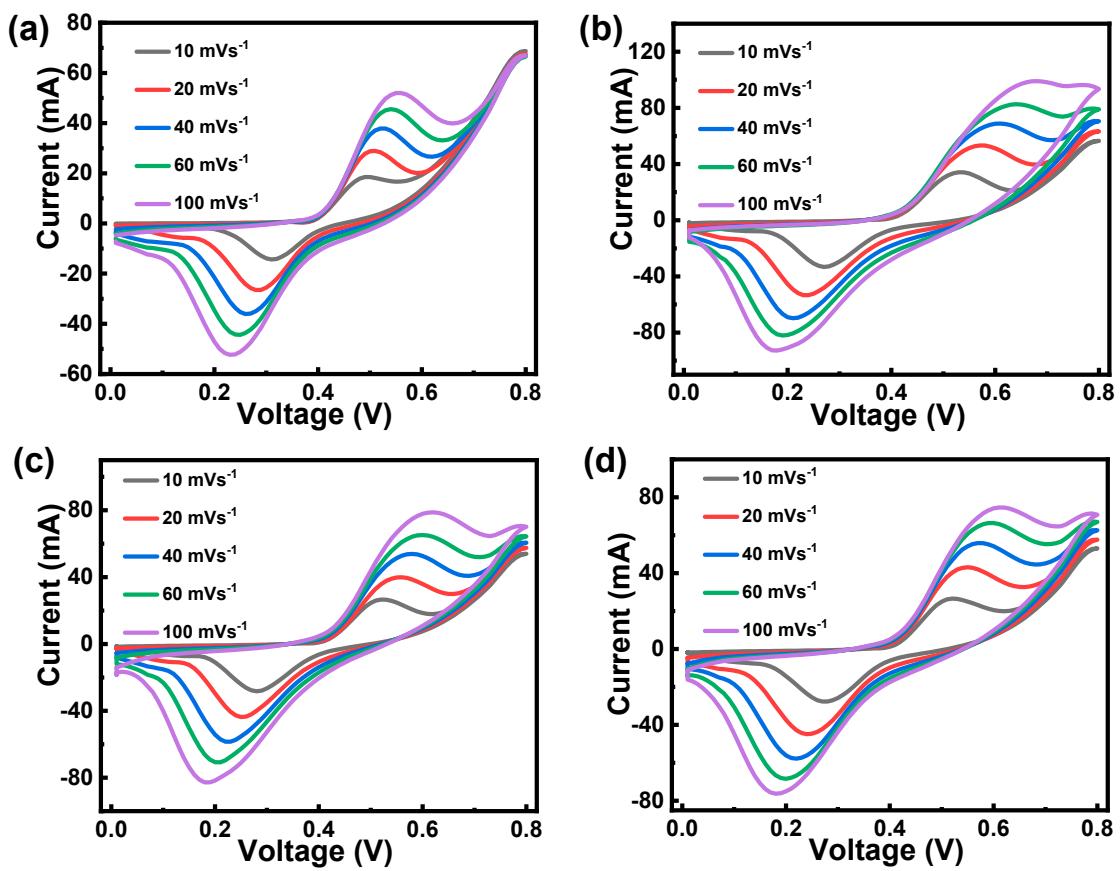
**Figure S2.** Bright TEM field image (a) HAADF TEM image (b) of INS1 electrode sample.



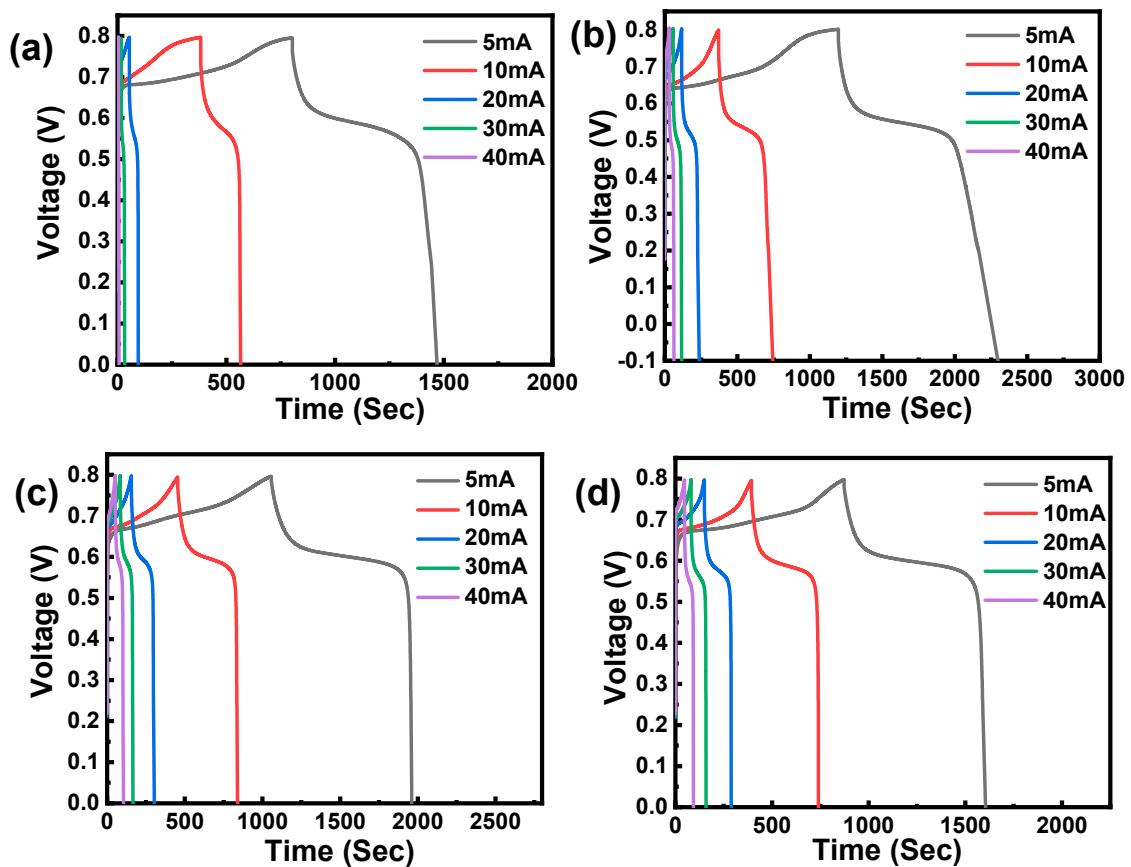
**Figure S3.** Colour mapping image of INS0, INS1, INS2, and INS5 samples.



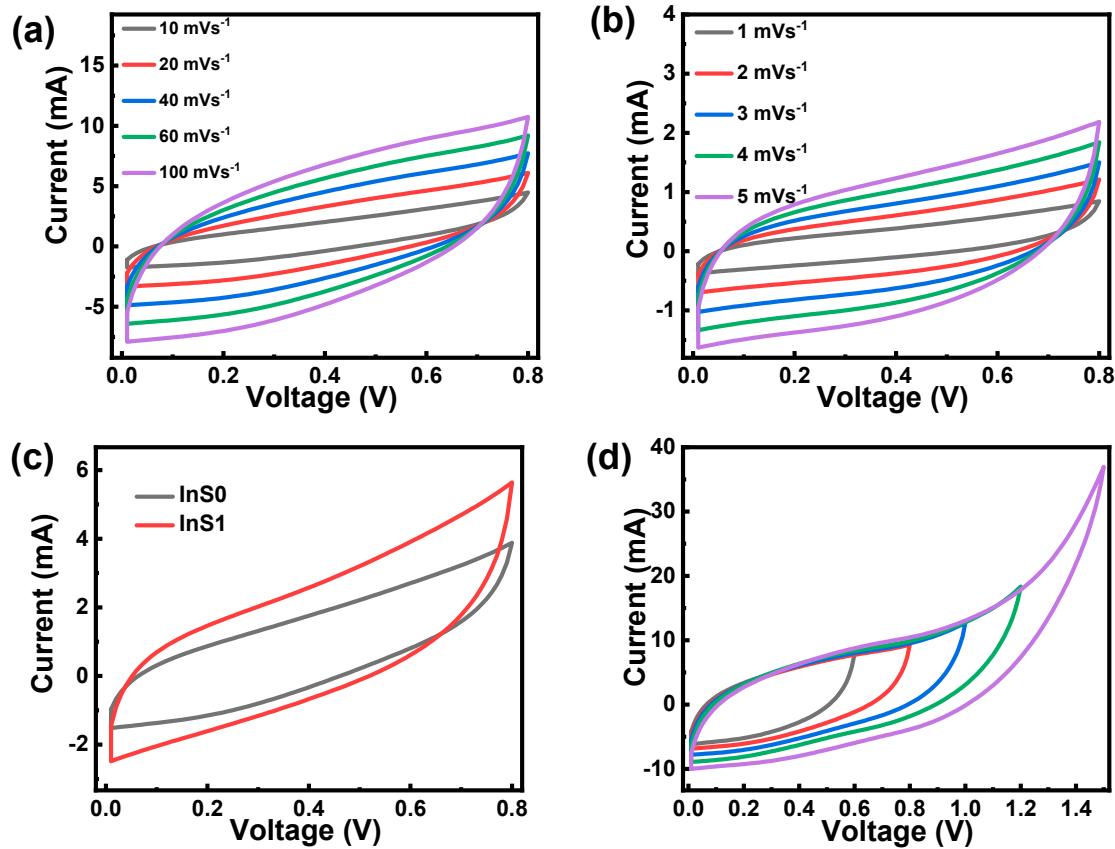
**Figure S4.** EDAX spectra of (a) INS0, (b) INS1, (c) INS2, and (d) INS5 samples.



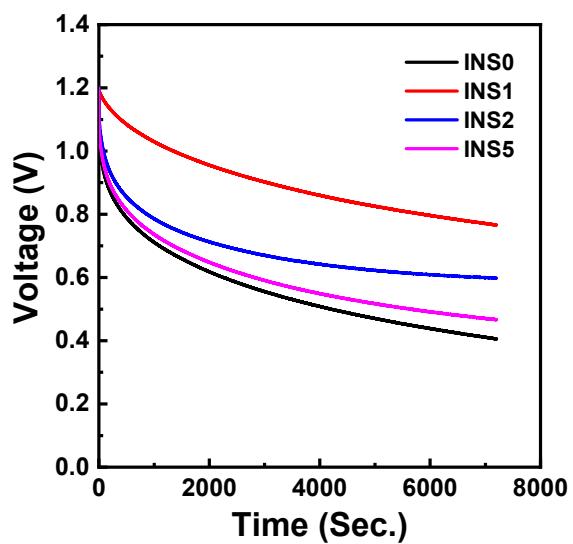
**Figure S5.** 3T CV curves of (a) INS0, (b) INS1, (c) INS2, and (d) INS5 samples.



**Figure S6.** 3T terminal GCD curves of (a) INS0, (b) INS1, (c) INS2, and (d) INS5 samples.



**Figure S7.** 2T CV curves at (a) higher scan rates ( $10 \text{ mVs}^{-1}$  to  $100 \text{ mVs}^{-1}$ ) of sample INS0, (b) INS1, (c) comparative CV spectra of INS0 and INS1 (d) CV curve at different potential window of fabricated SSC device.



**Figure S8.** Leakage current spectra of all prepared samples.