## *(Research Article 8)*

### "Melamine-based Polymer Networks Enabled N, O, S Co-doped Defect-rich Hierarchically Porous Carbon Nanobelts for Stable and Long-cycle Li-ion and Li-Se Batteries".

**Published in:** J. Colloid Interface Sci. 2020
**DOI:** 10.1016/j.jcis.2020.06.071
**تاريخ النشر : يونيه 2020**

## Abstract:

Li-Se battery is a promising energy storage candidate owing to its high theoretical volumetric capacity and safe operating condition. In this work, for the first time, we report using the whole organic Melamine-based porous polymer networks (MPNs) as a precursor to synthesize a N, O, S co-doped hierarchically porous carbon nanobelts (HPCNBs) for both Li-ion and Li-Se battery. The N, O, S co-doping resulting in the defect-rich HPCNBs provides fast transport channels for electrolyte, electrons and ions, but also effectively relieve volume change. When used for Li-ion battery, it exhibits an advanced lithium storage performance with a capacity of 345 mAh $g^{-1}$ at 500 mA $g^{-1}$ after 150 cycles and a superior rate capacity of 281 mAh g-1 even at 2000 mAh g-1. Further density function theory calculations reveal that the carbon atoms adjacent to the doping sites are electron-rich and more effective to anchor active species in Li-Se battery. With the hierarchically porous channels and the strong dual physical-chemical confinement for Li2Se, the Se@ HPCNBs composite delivers an ultra-stable cycle performance even at 2 C after 1000 cycles. Our work here suggests that introduce of heteroatoms and defects in graphite-like anodes is an effective way to improve the electrochemical performance.