

## Ordered mesoporous CoSn intermetallic materials for Li-ion battery

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Ordered mesoporous CoSn intermetallic ( $\text{Co}_x\text{Sn}_y$ ) materials with various Co/Sn atomic ratios are successfully synthesized for the first time through nano-replication technique as stable and high high-power anode materials for Li-ion battery. The electrochemical results show that reversible capacity, Coulombic efficiency and cycle stability of mesoporous  $\text{Co}_x\text{Sn}_y$  materials are dependent on their structure and composition. Especially, the ordered mesoporous  $\text{Co}_{0.3}\text{Sn}_{0.7}$  material shows exhibits 83% capacity retention after 50<sup>th</sup> cycle, which means that mesoporosity as well as Co atoms incorporation effectively accommodate the volume strain during lithiation-delithiation processes. Rate performance of mesoporous  $\text{Co}_{0.3}\text{Sn}_{0.7}$  anode is also significantly improved, which was is deeply probably related to the kinetic behaviors such as low polarization resistance and large diffusion coefficient. Electron microscopy and small angle X-ray scattering investigations have proved our understating of the sustainable pore system and the effectivity of mesostructure.