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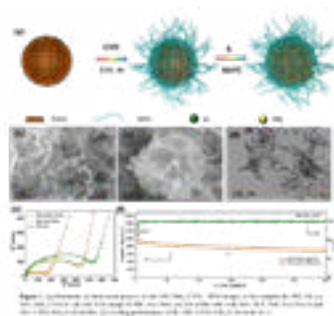
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In situ synthesis of 3DC-NiS₂-CNTs as a multi-functional host for Li-S batteries

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Lithium sulfur (Li-S) batteries are promising to be the next generation energy storage devices. Unfortunately, there are still many challenges for the practical application of Li-S batteries, such as the insulation of sulfur and the “shuttle effect” of lithium polysulfides (LiPSs). The introduction of carbon materials as a light, high electronic conductive host for sulfur and the inorganic compound as the polar host for the LiPSs has made some progress in solving these problems. Herein, for the first time, we present a new synthetic route to obtain the three-dimensional carbon-NiS₂-carbon nanotubes (3DC-NiS₂-CNTs) composites as the multi-functional host for Li-S batteries. The 3DC and CNTs are connected by the NiS₂ nano particles, which serves as both effective entrapment and catalysis for LiPSs. The effective combination of graphene, CNTs and NiS₂ can not only inherit their individual advantages, but also herald a new multi-functional nanostructured material with unexpected properties. As a consequence, electrochemical performance of the Li-S batteries employing a 3DC-CNTs-NiS₂ host was enhanced significantly. The cell exhibits a high initial capacity 946 mAh g⁻¹ and stable cycling performance at 1 C with a fade rate of 0.093% per cycle over 300 cycles.



Recent Publications:

1. Zhong Y, Yin L, He P, Liu W, Wu Z and Wang H (2018) Surface chemistry in cobalt phosphide-stabilized lithium-sulfur batteries. *Journal of the American Chemical Society* 140(4):1455–1459.
2. Paoletta A and Zaghbi K (2018) The Role of Metal Disulfide Interlayer in Li-S Batteries. *Journal of Physical Chemistry C* 122(2):1014-1023.
3. Babu G, Arave L M R (2017) Transition Metal Dichalcogenide Atomic Layers for Lithium Polysulfides Electrocatalysis. *Journal of the American Chemical Society* 139(1):171-178.

Biography

Ning Wang entered into Nanjing Tech University to study Metal Material Science and Engineering in 2008, and received his Bachelor degree in 2012. Then he continued to study Post graduation degree in Nanjing Tech University, engaged in research on lithium sulfur batteries. And he received his Master degree in 2015. After that, he entered Tianjin University to study PhD and his research direction is still lithium sulfur batteries.

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