Materials Poster Abstract

2D and 3D nanostructured graphenes as electrode matrices in Li-S batteries

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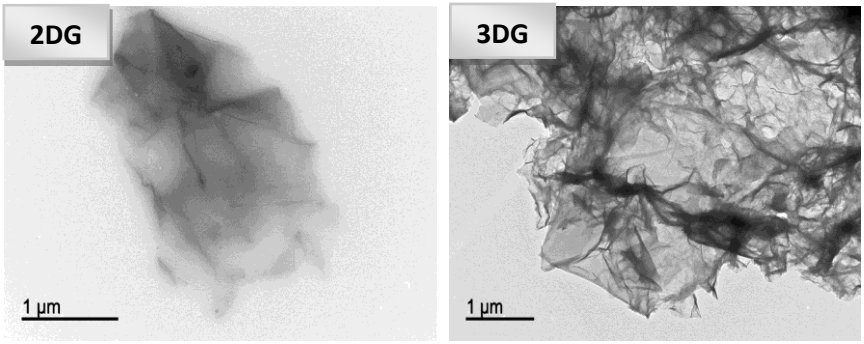
This work proposes the use of graphenes with different morphological characteristics to prepare graphene-sulfur (G-S) composites for use as cathode in Li-S batteries. The three-dimensional graphenes (3DG) enhance textural properties, providing a higher specific surface area and pore volume than the two-dimensional graphenes (2DG) obtained by thermal exfoliation.



The synthesis of 3D graphenes is carried out from graphitic oxide (GO), derivative of graphite. GO is prepared by the modified Hummers' method, and subsequently, by means of a reduction step, 3DG are obtained using a hydrothermal treatment with determined conditions of pressure and temperature. The properties of 3DG are improved by doping with nitrogen, thanks to the use of urea.[1]

G-S composites are prepared by a chemical method that uses ethylenediamine to form nano-particles of sulfur, achieving functionalized graphenes with a better electrochemical stability.[2] The strong affinity of sulfur for this graphene allows to develop batteries with good properties of cycling and high energy density. The results show remarkable electrochemical performance, achieving high values of specific capacity (830 $Ah \cdot kg^{-1}$) and energy density (1660 $Wh \cdot kg^{-1}$).

References

1. G. Zhou, E. Paek, G. S. Hwang and A. Manthiram, Nat. Commun., 2015, 6.
2. H. Chen, C. Wang, W. Dong, W. Lu, Z. Du and L. Chen, Nano Lett., 2015, 15, 798-802.