Freestanding r-GO aerogel discs and their performance as electrodes in fluorine free Li-S battery catholyte

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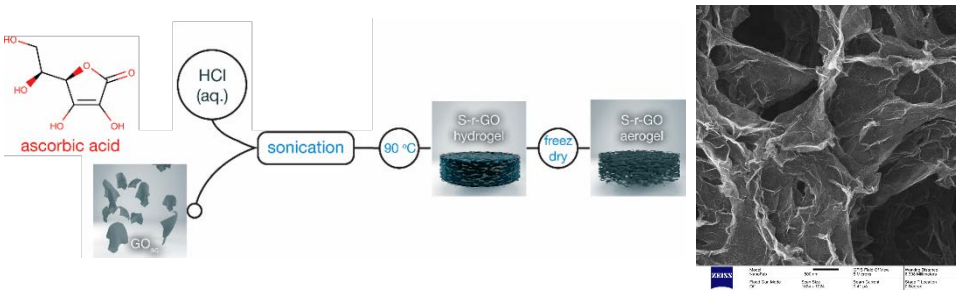
Lithium-sulfur batteries are the closest Next Generation Battery technology to commercialisation. In theory, they can achieve the requirements for a high energy storing device that can replace fossil fuel overtaking Li-ion batteries. This is because they best Li-ion batteries on many fronts [1]. However, Li-S batteries suffer from abysmal cycle life which hinders its development into a fully marketable product [2].

Graphene is a nanomaterial of interdisciplinary interest with unique properties such as high optical transmittance, excellent thermal conductivity and superior mechanical strength. Recently, due to the electronic conductivity and flexible nature it has been proposed as new candidate for application in energy storage fields such as supercapacitor or Li/Na batteries [3].

Herein we report an optimised, simple, and environmentally benign synthesis route of freestanding r-GO aerogel electrodes for Li-S batteries using graphene oxide (GO), HCl and L-ascorbic acid [4]. The electrochemical performance of the r-GO aerogels electrodes was demonstrated in fluorine-free polysulfide catholyte Li-S cells. They showed high specific capacity and relatively stable cycling performance. Furthermore, the resulted aerogel microstructure is examined by helium ion microscopy (HIM) [5] and it is composed of porous matrix of cross-linked few layers of r-GO. The reduction of the graphene oxide was confirmed by XRD and Raman spectroscopy.



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