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Graphdiyne for High Capacity and Long-Life Lithium Storage

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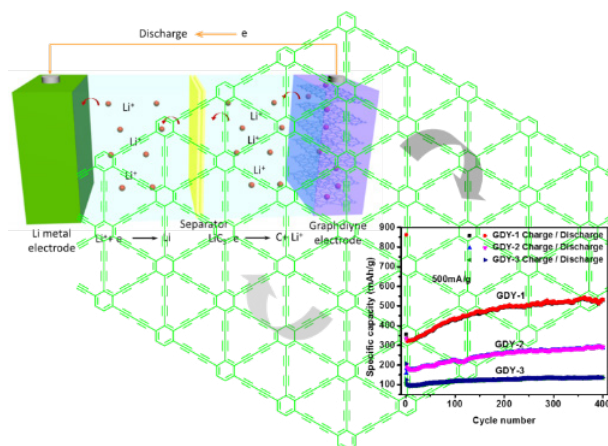


Fig 1 Graphdiyne for High Capacity and Long-Life Lithium Storage

Although the Li capacity can be improved greatly with these different dimensionalities and morphologies, the nature of the Li-intercalated layer does not change significantly when compared to graphite. Graphdiyne (GDY) is a new carbon allotrope that was only synthesized recently. GDY is composed of sp²- and sp-hybridized carbon atoms and is predicted to be the most stable of the various diacetylenic non-natural carbon allotropes. Here, we will report the application of GDY as high efficiency lithium storage materials and elucidate the method of lithium storage in multilayer GDY (Fig 1)^[1-3]. Lithium-ion batteries featuring GDY-based electrode exhibit excellent electrochemical performance, including high specific capacities, outstanding rate performances, and a long cycle lives. We obtained reversible capacities of up to 901 mAh/g after 400 cycles at a current density of 100 mA/g. At an even higher current density of 2 A/g, cells incorporating GDY-based electrodes retained a high specific capacity of 420 mAh/g after 1000 cycles. We hope that designing and preparing novel carbon-based materials with large pores will open up new approaches for the development of Li storage materials exhibiting high capacities and excellent cycling stabilities, thereby satisfying the future requirements of next-generation Li storage batteries.

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