Facile Synthesis of a Covalent Trizene Framework mediated Via Elemental-Sulfur High-Performance Lithium-Sulfur Batteries

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A novel environmentally mild approach for the synthesis of Covalent Trizene Frameworks (CTFs) using sulfur mediated polymerization under catalyst and solvent-free reaction conditions. A high sulfur content of 62 wt% can be achieved by 1,4 -dicyanobenzene with controlling elemental sulfur ratio. The reason of the sulfur content sulfur with equal distribution through CTF matrix are the in situ formation of the framework structure, and chemical sulfur impregnation within the micropores of the framework which overcomes the solution and the dissolution of polysulfides into the electrolyte. Because of the inherent properties of CTF formation, it promotes the electron and ion transport mechanisms (1). However, these excellent results of battery performance and sulfur content, these results aren't sufficient for the demands of high-performance batteries. Consequently, new Fluoronated Covalent Trizene Frameworks (F-CTFs) synthesized by the same methodology using fluorinated 1,4- dicyanobenzene to achieve highly sulfur content < 80 wt%, and remarkable battery performance: specific capacity of 1138.2 m Ah g^{-1} at 0.05C, initial coulombic efficiency of 93.1%, and capacity retention of 81.6% after 300 cycles (2).

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