Title: 2D g-C_3N_4 as cathode host in Lithium Sulfur Batteries

Lithium-sulfur battery (LSB) is a very promising candidate in the next generation battery systems due to its high specific capacity (1675 mAh/g) and low cost. Novel host materials, which are designated to suppress the dissolution of lithium polysulfides (LiPS) into electrolyte, play critical roles to solve the long-term cycling problem in LSB.

Inspired by the recent success of improved anchoring of lithium polysulfides (LiPS) through heteroatom doping in carbon frameworks, graphitic carbon nitride (g-C_3N_4) represents as a promising host material with typical 2D layered structure like graphite and very high nitrogen content. In fact, g-C_3N_4 can be deemed as stacking of graphene- like sheets where one out of two carbon atoms is replaced by nitrogen and a carbon vacancy is created simultaneously, resulting in systematic changes in chemical properties compared to carbon materials.

The overall objectives of the project are to develop facile scalable synthetic strategies to improve the cyclic and/or rate performance of the sulfur-based cathode, acquire knowledge and mechanism about the structure control, structure-property correlation of the sulfur anode. All research within the components will be realized in the form of pouch cells produces at the Ford PERDC facility at Windsor.

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