Ordered Mesoporous Carbon/Sulfur compoiste simply modified with amine- and hydroxyl-group rich Biopolymer as Cathode for Lithium-Sulfur batteries

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Lithium-sulfur (Li-S) batteries have been considered as promising next generation batteries. However, problems - insulating nature of sulfur, dissolution of high order polysulfides (Li_2S_8 ~ Li_2S_4) and poor reversibility of low order polysulfides (Li_2S_2 / Li_2S) - hamper commercialization of Li-S batteries. Even though porous carbons have been attracted as support material for sulfur to overcome these issues, weak binding nature of carbon with polysulfides causes poor electrochemical performance. Herein, we report that amine- and hydroxyl- rich biopolymer coated on ordered mesoporous carbon (OMC) can caputre polysulfides in lithium-sulfur (Li-S) batteries. Strong binding of functional groups in biopolymer with the polysulfides prevents dissolution of soluble intermediates (Li_2S_8 ~ Li_2S_4) and improves dispersion of insulating discharge products (Li_2S_2 / Li_2S). Coulombic efficiency of biopolymer modified OMC/S composite was 99.9% at the 140th cycle, and specific capacities of modified OMC/S composite were 32.4% and 51.6% higher than those of bare OMC/S composite at 100th and 140th cycle, respectively.