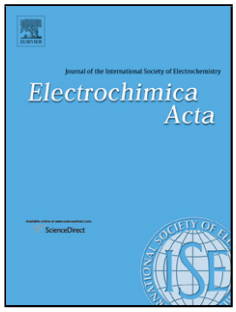

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Enhanced Cycling Stability of Sulfur Cathode Surface-Modified by Poly(N-methylpyrrole)

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Abstract: Sulfur has the highest redox capacity in all the solid electrode materials but its application for Li-S batteries is restricted by its poor cycleability due to the dissolution of its polysulfide intermediates produced during charge and discharge reactions. To solve this problem, we proposed a new strategy to suppress the dissolution of the polysulfide intermediates and the agglomeration of the discharge products through surface-modification of the sulfur electrode by in-situ electropolymerized poly(N-methylpyrrole) (PNMP). The PNMP-modified sulfur electrode exhibits stable surface morphology during charge and discharge, effectively depressing the structural collapse of the sulfur electrode. The charge-discharge measurements reveal that the PNMP-modified S/C electrode can deliver the same high reversible capacity as the bare electrode but demonstrate a much improved cycling stability with excellent capacity retention of 78.1 % over 200 cycles with respect to the discharge capacity in the third cycle, considerably higher than that of the bare electrode (59.8 %). In addition, this surface