Molten Salt Synthesis of High Performance 3D Porous Hard Carbons for Sodium-Ion Batteries

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As an alternative to lithium-ion batteries,Sodium-Ion Batteries recently emerged, in which significant researches focus on hard carbon-based anode materials featuring high gravimetric capacity and rate capability.In order to achieve the high performance, hard carbon materials require to have either high surface area for pore filling/plating or large interlayer distance between graphene-like layers appropriate for large Na-ion intercalation.To this end, we developed a versatile synthesis method of hard carbons by using molten salt as a reaction medium and a cheap sugar as a molecular precursor of carbon. This enabled a facile modification of hard carbons in terms of morphology,porosity,microstructure,and electrochemical performance. The resulting three-dimensional porous hard carbons,referred to as GL-Br,allows efficient Na-ion storage via both intercalation and pore filling,contribution of which could be controlled simply by the content ratio of glucose to the molten salt.We found that the GL-Br delivers a high specific capacity of ~400 mAh/g at 250 mA/g after 100 cycles,which makes the GL-Br one of the best anode hard carbon material for SIBs.