A new approach using ammonium fluoride to synthesize high capacity electrodes for Li-ion batteries

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In this study, we developed a new approach using ammonium fluoride (NH4F) to synthesize metal fluoride composites for high capacity cathodes and nanostructured silicon for high capacity anodes of Li-ion batteries (LINs). We found that various metal fluorides can be prepared through simple heat treatment of metal precursors with NH_4F under an inert atmosphere. Based on this approach, metal fluoride/carbon composites were also obtained successfully. From the mechanism of this synthetic approach, we designed a new method to remove residual impurities in the raw Si materials, such as SiO_2. Interestingly, the reaction of raw Si materials with NH_4F not only removed residual SiO_2, but also generated nanopores on Si. Metal fluoride composites and nanostructured Si showed improved electrochemical performance as cathode and anode materials of LIBs, respectively. We expect that this new approach using NH_4F will motivate various research into the preparation of advanced electrode materials for LIBs.