

Sodium metal fluoride ( $\text{NaMF}_3$ ) nanoparticle clusters in uniform and regular shaped synthesized by solvothermal process

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Sodium metal fluorides ( $\text{NaMF}_3$ ) are one of promising material due to their distinctive magnetic properties depending on metals and potential for electrode in lithium ion batteries. Synthesis in uniform and nano structuring is important to maximize their advantages with large surface area and short electron/ion diffusion pathway. However, Ball-milling of bulk sized materials and roll-quenching process are hard to control particle size precisely and regularly. We report a facile and novel synthesis method for Nanostructured sodium cobalt fluoride ( $\text{NaCoF}_3$ ). By solvothermal process, nanoparticles (~20nm) were assembled to form nanoparticle clusters (NPCs, ~200 nm). Precursors are also inexpensive and common compared to normally used precursor. Reaction conditions were investigated including temperature, reaction time and essential additive (trisodium citrate) effect to obtain uniform  $\text{NaCoF}_3$  NPCs. Analytic tools such as SEM and XRD showed  $\text{NaCoF}_3$  is well synthesized uniformly without impurities. This NPC is expected to contribute to various nanostructured  $\text{NaMF}_3$ .