Nickel Hexacyanoferrate as Cathode Materials for Aqueous Batteries

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The aqueous batteries have come to the fore due to the safety issues of conventional nonaqueous batteries. Accordingly, the various cathode materials for aqueous batteries have been investigated. Among them, we have focused on nickel hexacyanoferrate (NiHCF), which has large interstitial site and spacious channels, so the large size metal ions can be (de)intercalated through it.

However, during the synthetic process, the precursors tend to be united rashly, resulting in poor crystallinity. It causes random morphologies and impedes the facile diffusion of metal ions, limiting the ideal capacity. In addition, the electronic conductivity of NiHCF is relatively low, so additional conductive agents should be introduced to be used as electrode materials.

In this study, we have made the NiHCF particles with ordered morphologies, which were combined with conductive agents subsequently. The as-made samples were applied to representative aqueous batteries like sodium-ion batteries. The fine-structure NiHCF with conductive agents exhibited excellent qualifications as cathode materials for aqueous batteries, which is expected to open the new era of next-generation batteries.