Iron (VI) Battery Performance and Stability of Ferrate Cathodes

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Abstract:
In this paper we report on the high power discharge performance and impedance characteristics of potassium ferrate (K$_2$FeO$_4$) and barium ferrate (BaFeO$_4$) cathodes in zinc alkaline dry cells. Results from earlier experiments show that ferrate materials promise superior performance over electrolytic manganese dioxide at operating voltages exceeding 1.6 V and currents as high as 100 mA per gram of active material [1]. Unfortunately, high impedance of discharge products limits full utilization of ferrate charge capacity. Traditional carbon based additives can enhance conductivity, but also compromise ferrate stability and accelerate Fe(VI) decomposition. Ongoing studies are investigating the use of nanoparticulate coatings to improve ferrate performance in both alkaline and lithium based electrolytes.