MS18-P01 | Prussian Blue analogues as cathode material in low cost aqueous batteries

Kjeldgaard, Solveig (Aarhus University, Aarhus, DNK); Najbjerg Skov, Lasse (Aarhus University, Aarhus N, DNK); Brummerstedt Iversen, Bo (Aarhus University, Aarhus, DNK); Bentien, Anders (Aarhus University, Aarhus, DNK)

In order to increase the use of sustainable energy sources like solar and wind, new solutions in terms of energy storage are needed to overcome their highly intermittent nature. For battery technologies to be relevant for grid-scale storage, the electrode materials must be low cost, environmentally benign, have high energy efficiency and long cycle life. Because of the requirement for cheap electrode materials, the choice of elements are limited to earth abundant transition metals such as iron, manganese, zinc and copper.

In this work, eight Prussian blue analogues (PBAs) are investigated as cathode material in large-scale, low cost aqueous batteries. Prussian blue analogues are a large family of transition metal hexacyanoferrates with the general structural formula $A_XM[Fe(CN)_6]$, where A is a cation and M is a transition metal. PBAs are practically insoluble and are structurally very stable towards insertion/extraction of ions, why they have very good cycling capabilities. PBAs can be used in aqueous electrolyte with a wide range of insertion ions. Here, PBAs with M: Fe, Mn, Zn and Cu are synthesized in both the oxidized and reduced form. The structural differences and similarities are discussed and the electrochemical performance is evaluated using cyclic voltammetry.