ABSTRACT - POSTER

High temperature X-ray diffraction study of sodium vanadate electrode materials for zinc-ion batteries

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Aqueous zinc-ion batteries (ZIBs) are promising rechargeable batteries for grid storage applications, because of the high theoretical capacity, high abundance, low toxicity, and affordable cost of metallic zinc. Sodium vanadates, also investigated for Li-ion, Na-ion, or Mg-ion batteries, have been receiving a lot of interest as positive electrode materials for ZIBs because they offer better structural stability than $V_2O_5(\cdot xH_2O)$ during the insertion and extraction of voluminous zinc ions and H_2O molecules. The sodium vanadate family spans a broad range of compositions, including anhydrous or hydrated crystalline phases, as well as nanocrystalline or amorphous hydrated materials.

This poster communication reports on synthesis experiments performed by stirring V_2O_5 powder in NaCl aqueous solutions. High-temperature X-ray diffraction was used to follow the crystallization of different precursors into mixtures of V_2O_5, β-$Na_{0.33}V_2O_5$ and $Na_{1+x}V_3O_{8-\delta}$ phases. The electrochemical performance of the single-phase materials was tested as positive electrode materials in aqueous ZIBs.