Hydrothermally synthesized $H_2V_3O_8$ as cathode material for Li-ion batteries

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Vanadium pentoxide (V_2O_5) is a transition metal oxide, which has been studied as cathode material for Li-ion batteries. Its advantages include high theoretical energy density (380 Wh kg^{-1}) [1], low cost and abundance. [2] However, practical energy densities of V_2O_5 have not surpassed 150–210 Wh kg^{-1} [1], mainly because of the limited specific surface area combined with low electrical conductivity and a low cycling stability. [2]

Therefore other types of layered vanadium oxides, e.g. hydrated vanadium oxide ($H_2V_3O_8$ or V_3O_7*H_2O), which possesses mixed valance states of V^{4+} and V^{5+} are used as cathode materials. These lead to an improved electronic conductivity and the hydrogen bonding in the interlayer of $H_2V_3O_8$ further stabilizes the structure. [3]

In this contribution, we present the properties of $H_2V_3O_8$ (Figure 1) synthesized under hydrothermal conditions as cathode material for Li-ion batteries.

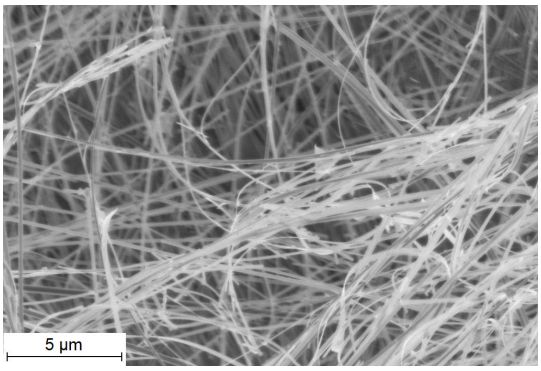

Figure 1 – SEM image of hydrothermally synthesized $H_2V_3O_8$

[1] Turgut M. Gür, Energy Environ. Sci. **2018**, 11, 2696-2767

[2] Wenchao Bi et. al. RSC Advances **2017**, 7, 7179

[3] Zuowei Liu et al. Solid State Ionics, **2019**, 329 74–81