All-solid-state lithium-sulfur battery based on a nanoconfined LiBH\(_4\) electrolyte - DTU Orbit (07/12/2018)

All-solid-state lithium-sulfur battery based on a nanoconfined LiBH\(_4\) electrolyte

In this work we characterize all-solid-state lithium-sulfur batteries based on nano-confined LiBH\(_4\) in mesoporous silica as solid electrolytes. The nano-confined LiBH\(_4\) has fast ionic lithium conductivity at room temperature, 0.1 mScm\(^{-1}\), negligible electronic conductivity and its cationic transport number (\(t^+ = 0.96\)), close to unity, demonstrates a purely cationic conductor. The electrolyte has an excellent stability against lithium metal. The behavior of the batteries is studied by cyclic voltammetry and repeated charge/discharge cycles in galvanostatic conditions. The batteries show very good performance, delivering high capacities versus sulfur mass, typically 1220 mAhg\(^{-1}\) after 40 cycles at moderate temperature (55°C), 0.03 C rates and working voltage of 2 V.

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