Synthesis of $Mg(BH_4)(NH_2)$ and its investigation as a solid-state Mg^{2+} ion conductor

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The development of rechargeable Mg batteries remains a challenge, particularly due to the difficulty to find non-corrosive liquid electrolytes with suitable ionic transport properties and a large electrochemical stability window[1]. A possible improvement could come from the use of a solid electrolyte. In this sense, $Mg(BH_4)(NH_2)$ has been reported by Higashi et al. as a solid Mg-ion conductor with a possible use in all-solid-state batteries[2].

In this study, the synthesis parameters of $Mg(BH_4)(NH_2)$ were carefully investigated. In addition to crystalline $Mg(BH_4)(NH_2)$, an intermediate phase was identified by an XRD analysis combined with ^{11}B MAS-NMR spectroscopy. The amount of this intermediate phase and its crystallinity were correlated to the synthesis parameters. Interestingly, the ionic conductivity is increased to $6x10^{-6}$ $S.cm^{-1}$ at 100°C with the presence of the amorphous intermediate phase; which is one of the highest conductivity values ever reported for a Mg^{2+} solid ionic conductor at such low temperatures[3,4].

The characterization of $Mg(BH_4)(NH_2)$ as a solid electrolyte material will be presented; especially by discussing its chemical and electrochemical stabilities.

References

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