Magnesium solid electrolytes based on coordination complexes of magnesium borohydride

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We present unprecedented high Mg\(^{2+}\) conductivity in chelated Mg complexes of magnesium borohydride, Mg(BH\(_4\))\(_2\). The highest conductivity of 5\(\times\)10\(^{-8}\) S cm\(^{-1}\) at 30 °C and 6\(\times\)10\(^{-5}\) S cm\(^{-1}\) at 70 °C was found in the borohydride-ethylenediamine complex Mg(en\(_1\))(BH\(_4\))\(_2\) as shown in figure 1. The coordination complexes are stable against elemental magnesium, support cycling in a potential window of 1.2 V, and allow reversible magnesium plating/stripping [1]. Our results demonstrate that partially chelated Mg\(^{2+}\) complexes represent a promising platform for the development of an all-solid-state magnesium battery.

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Reference