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Effect of ion size and charge density on the electrochemical characteristics of α - MoO_3 using aqueous Be^{2+} and Mg^{2+} sulfate electrolytes

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Abstract

We investigated the electrochemical characteristics of layer structured α - MoO_3 using two divalent ions (Mg^{2+} and Be^{2+}) of different sizes. The cyclic voltammetry studies showed a high specific capacity with Be^{2+} electrolyte, and galvanostatic intermittent titration (GITT) measurements revealed a higher diffusion coefficient for Be^{2+} in MoO_3 despite having a higher charge density than Mg^{2+} . The intercalation of both ions resulted in poor cyclability, but a slightly better performance with Be^{2+} electrolyte could be attributed to favored diffusion of Be^{2+} in MoO_3 due to its covalent nature as well as preferred coordination number.

Keywords: Diffusion; Electrochemical reactions; Electrode materials; Nanostructured materials; Energy storage materials.

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