

Borophene as an anode material for metal-ion Batteries

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1.ABSTRACT

Borophene is one-atom-thick 2D boron sheet with depicts excellent optical, electronic, metallic, semiconducting, high mechanical anisotropic, and photothermal properties. Metal-ion batteries use metal ions as charge carriers, and the anode material determines battery performance and stability. Borophene has been suggested as a potential anode material for metal ion batteries due to its high theoretical capacity, good electrical conductivity, high mechanical strength, low diffusion barrier and high surface area. This review discusses the existing theoretical and experimental basis of Flat, β_{12} , χ_3 , and *Pmmn* Borophene phases as anode materials for metal-ion batteries. Flat Borophene has advantages over β_{12} , χ_3 , and *Pmmn* phases, with the highest specific capacity and open circuit voltage for Li-ion, and second highest for Na-ion. Diffusion barrier is highest for the flat Borophene phase and lowest for the *Pmmn* phase. Also, *Pmmn* phase is difficult to synthesize compared to the flat Borophene structure. Therefore, flat Borophene is concluded to be a more practical and a better anode material than the other Borophene phases considered here.

Keyword: Borophene, Battery Anode, Diffusion barrier, Open circuit voltage, Electrical conductivity, Mechanical strength,

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