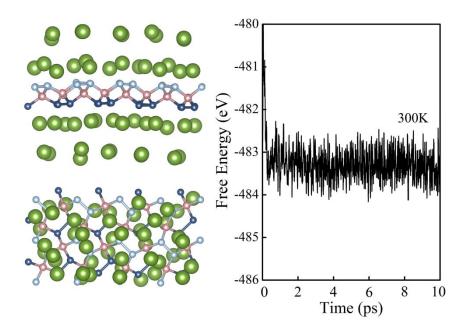
## **Supporting Information**

## $\label{eq:continuous_section} Two-Dimensional\ Penta-BN_2\ with\ High\ Specific\ Capacity\ for$ $\ Li-Ion\ Batteries$

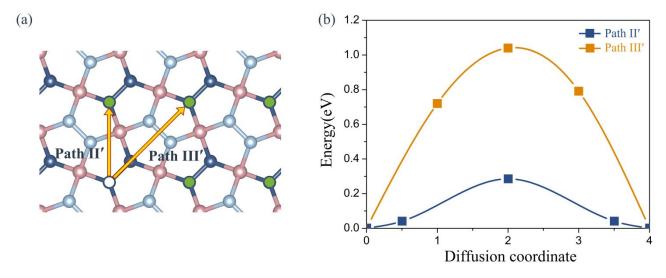
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**Figure S1.** Time evolution of free energy during the 10 ps AIMD simulations and the snapshot of 300 K for Li<sub>3</sub>BN<sub>2</sub>.



**Figure S2.** (a) Top view of single Li vacancy diffusion along the Path II' and Path III'. (b) The corresponding energy barriers of the Path II' and Path III'.