Lithium iron borate is an attractive cathode material for Li-ion batteries due to its high specific capacity and low-cost, earth-abundant constituents. However, experiments have observed poor electrochemical performance due to the formation of an intermediate phase, that is, Li$_x$FeBO$_3$, which leads to large overvoltages at the beginning of charge. Using a convex-hull analysis, based on Hubbard-corrected density functional theory (DFT+U), we identify this intermediate phase as Li$_{0.5}$FeBO$_3$. Moreover, we show by means of the nudged elastic band (NEB) method, that the origin of these adverse electrochemical effects can be explained by an intrinsically low Li-ion and electron/hole-polaron mobility in Li$_{0.5}$FeBO$_3$ due to high activation barriers for both the ionic and electronic transport. These studies include the effects of the experimentally reported commensurate modulation. We have also investigated the Li-ion/hole diffusion through the interface between Li$_{0.5}$FeBO$_3$ and LiFeBO$_3$, which is found not to result in additional kinetic limitations from Li diffusion across the intraparticle interfaces. These findings suggest that the experimentally observed diminished performance associated with the formation of intermediate phases is linked to the intrinsically poor properties of the Li$_{0.5}$FeBO$_3$ phase rather than to the presence of interfaces between different phases.