

Abstract Submitted  
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**Effect of anode morphology on charging rate in Lithium Ion Batteries** NING SUN, DILIP GERSAPPE, Dept of Materials Science and Engg, Stony Brook University, Stony Brook NY 11794 — Carbon materials such as graphite are widely used in Lithium Ion Batteries as an active component for the anode. We set up a 3-D Lattice Boltzmann model to simulate the intercalation reaction of graphite anode during charging process. Our model considered the mass transfer both inside and outside of anode, and the equilibrium potential drop of the anode material as a function of local charge amount. By using a simple spherical anode morphology, we tested the shrinking core model. Our simulation showed the influence of current density and diffusion speed of Li ion in the graphite phase on phase boundary movement and determined when the outer layer of anode is fully charged. We further developed our anode morphology to a random particle model, and studied the influence of current density and porosity of anode on the total charge of the system. Our results show that it is possible to obtain both high charging capacity and charging rate by adjusting the morphology of anode.

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