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Mechanisms of dendrite formation in Lithium Ion Batteries NING SUN, Stony Brook University, DILIP GERSAPPE, Dept of Materials Sci and Engg, Stony Brook University, Stony Brook NY 11794 — The formation of dendrite on the anode of Lithium-Ion Batteries during charging process can compromise the safety of the battery. By using a Lattice Boltzmann Method we simulated the mechanisms of dendrite formation. We postulated a way to monitor the growth of dendrites by recording the rate of change of the surface area of anode. Our results showed that the onset of dendrite will happen after the Sand's time when the current density is larger than a critical value. We also show that the Sands time is affected by the local curvature, particularly at low current densities. We also find that the roughness of the anode influences dendrite formation only when current density is not very high (around the critical current density). Our results show that it is possible to suppress the growth of dendrites by applying pulses during the charging process if the frequency of the pulse is chosen properly. Our model is able to study the discharge process as well, and we find that during the cycling process, high aspect ratio regions formed during charging, might break off from anode during discharging, and the anode surface will get rougher and rougher during the cyclic process, thus possibly increasing the propensity to form dendrites.

Ning Sun
Dept of Materials Sci and Engg, Stony Brook University, Stony Brook NY 11794

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