

## **Cyclic performance degradation of silicon thin film as lithium ion battery**

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The present work investigates diffusion-induced stress in silicon thin film and its effect to the cyclic performance for lithium ion battery. A 250nm thick film was simulated to solve for the mass diffusion problem and stress analysis considering crack propagation. Based on the individual simulation results, a computational framework was established to study the cyclic performance of silicon anode for lithium ion battery. The crack initiation and propagation lead to the pulverization of silicon thin film and the damaged surface results in the degradation of life cycle of lithium ion battery. It is expected that the proposed computational framework predict the cyclic performance of a silicon thin film in an iterative manner.

**Keywords:** Lithium Ion Battery, Silicon Thin Film, Anode, Diffusion-induced Stress, Finite Element Method