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Advancements in Multiscale Multiphysics Chemomechanical Modeling of Lithium-Ion Batteries

Guest Editors:

Dr. Yasir Ali

Dr. Noman Iqbal

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Deadline for manuscript submissions:
closed (30 July 2024)

Message from the Guest Editors

Dear Colleagues,

Lithium-ion batteries are regarded as one of the most suitable energy storage devices because of their high energy density and long cyclability. However, the capacity of Li-ion batteries severely decreases as the number of charge–discharge cycles increases. The lithium concentration gradient contributes to diffusion-induced stress (DIS) inside the particles during charging and discharging. The multiscale nature of the battery requires an understanding of the coupling mechanism between the electrode behavior at microscale and the overall cell behavior at macroscale. The current Special Issue focuses on new developments and improvements in multiscale multiphysics chemomechanical models to understand the possible mechanical failure mechanisms and mitigate the capacity fade.

Lithium-ion battery;
Diffusion-induced stress;
Heterogeneous SEI layer;
Chemomechanical 2D/3D multiparticle modeling;
Multiscale modeling;
Stress–potential coupling;
Core–shell;
Particle–binder debonding;
Abaqus;
Mechanical failure analysis of lithium-ion batteries;
Capacity fading;
Finite element analysis;
COMSOL Multiphysics;

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Special Issue

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Message from the Editor-in-Chief

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