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SAE World Congress

A new approach to Li-ion battery modeling

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A completed mesh for cathode active material (the electrolyte has been removed for clarity).

SAE 2013 World Congress SPECIAL COVERAGE

Porosity (negative electrode) | Ceramic layer (Separator) | Porosity (positive electrode)

Tech Blog view more

SAE reconfirms that R-1234yf refrigerant is 'safe and effective'

Most models of lithium-ion batteries follow the one-dimensional analysis approach. The major drawback of this is that the porosity and liquid-phase salt transport and solid-phase electronic conductivity are not explicitly resolved and the diffusion of lithium into and out of solid is modeled using representative spherical particles assuming perfect symmetry. These modeling assumptions limit the achievable accuracy; refinement of spatial computational grid and time steps cannot overcome the modeling error introduced by the above assumptions.

Researchers at Battery Design LLC and CD-adapco set out on a new approach, one that would avoid the limitations of the standard approach by resolving the structure of the electrode and explicitly modeling the transport of lithium in the electrolyte and solid phases. The following factors motivated the researchers to go down this path.

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A privately owned company, CD-adapco has maintained 17% organic year-on-year growth over the last 5 years. CD-adapco employs 700 talented individuals, working at 30 different offices across the globe.

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