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[Home](#) > A new approach to Li-ion battery modeling

A new approach to Li-ion battery modeling

The screenshot shows a webpage from 'automotive ENGINEERING Online international'. The article title is 'A new approach to Li-ion battery modeling', dated '16-Dec-2012 23:15 GMT'. It features a 3D visualization of a completed mesh for cathode active material, with a caption stating 'A completed mesh for cathode active material (the electrolyte has been removed for clarity)'. To the right, there is a 'SAE 2013 World Congress SPECIAL COVERAGE' banner and a 'Tech Blog' section with the headline 'SAE reconfirms that R-1234yf refrigerant is 'safe and effective'' and a 'view more' link.

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.

Industries:

[Batteries](#) [1]

[A new approach to Li-Ion battery modeling](#) [2]

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