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The “Buffer Layer” An Improved Electrode-Electrolyte Interface For Solid-State Batteries

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Abstract : Solid-state lithium batteries are broadly accepted as promising candidates for application in the next generation of EVs as they should offer safer and higher-energy-density batteries. Nonetheless, their development is impeded by many challenges, including the resistive electrode–electrolyte interface originating from the removal of the liquid electrolyte that normally permeates through the porous cathode and ensures efficient ionic conductivity through the cell. One way to tackle this challenge is by formulating composite cathodes containing solid ionic conductors in their structure, but this approach will require the conductors to exhibit chemical stability, electrochemical stability, flexibility, and adhesion and is, therefore, limited to some materials. Recently, Arkema developed a technology called buffering layer which allows the transformation of any conventional porous electrode into a catholyte. This organic layer has a very high ionic conductivity at room temperature, is compatible with all active materials, and can be processed with conventional Gigafactory equipment. Moreover, this layer helps protect the solid ionic conductor from the cathode and anode materials. During this presentation, the manufacture and the electrochemical performance of this layer for different systems of cathode and anode will be discussed.

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