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Thin Film Coatings on Cathode Materials in Lithium Batteries

Fanny Poon

Western University, fpoon6@uwo.ca

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Lithium-ion batteries (LIBs) are the energy storage technology currently used in electric vehicles (EVs). Unfortunately, EVs have limited mileage compared to gasoline vehicles, meaning that many drivers who would like to curb fossil fuel emissions are nonetheless reluctant to buy them. One way to improve the mileage is to replace the liquid electrolytes in LIBs with a solid-state electrolyte, converting them into all-solid-state lithium batteries (ASSLBs) which are able to provide more energy. ASSLBs offer additional advantages, such as improved safety and wider operating temperature range. Compatibility and stability issues exist nevertheless between the cathode and solid-state electrolyte battery materials. My research focuses on the application of thin film coatings on the cathode to effectively protect the cathode and prevent these issues from occurring. In my research, I prepare and assemble batteries, which I then test to gain an understanding on how the coatings affect the battery performance.