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Enabling manufacturing composite cathodes through aqueous processing for lithium-ion batteries

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Production of lithium-ion batteries (LIBs) is foreseen to grow dramatically with their application to electric vehicles (EVs). However, LIBs cost for all EVs is currently between $325-$500/kWh and the target cost is set at $125/kWh by EV everywhere. Majority of the battery cost comes from material and associated processing. This talk will discuss manufacturing LIB electrodes through aqueous processing, which induces significant cost reduction and is more environmental benign. For conventional LIBs, manufacturing of composite electrodes involves a slurry process in which the active material is mixed with other additives in a solvent, typically N-methyl-2-pyrrolidone (NMP). The high NMP cost and expensive NMP recovery add significant manufacturing cost to the LIB pack. A cost reduction in switching manufacturing electrodes from NMP to aqueous processing will be discussed. Replacing NMP with water induces some problems, including dispersion stability due to the interaction between particles, poor electrode wetting on current collectors due to the high surface tension of aqueous dispersion, etc. Strategies to tackle such problems and enable aqueous processing for electrode manufacturing will be addressed and some examples will be provided.

Biography

Jianlin Li received his PhD in Materials Science and Engineering from University of Florida in 2009. He then joined Oak Ridge National Laboratory as a postdoctoral research associate and became a staff scientist in 2012. He has strong background and extensive experience in electrochemistry, material synthesis, processing and characterization. His research areas include batteries, fuel cells and mixed electronic and ionic conductors. He has published more than 30 papers, authored two book chapters, and filed 4 patents and invention disclosures. He is currently leading the effort in electrode manufacturing for lithium-ion batteries at the DOE Battery Manufacturing R&D Facility at ORNL.

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