Abstract

One of the most prominent energy storage technologies which are under continuous development, especially for mobile applications, is the Li-ion batteries due to their superior gravimetric and volumetric energy density. However, limited cycle life of Li-ion batteries inhibits their extended use in stationary energy storage applications. To enable wider market penetration of Li-ion batteries, detailed understanding of the degradation mechanisms is required. A typical Li-ion battery comprised of an active material, binder, separator, current collector, and electrolyte, and the interaction between these components plays a critical role in successful operation of such batteries. Degradation of Li-ion batteries can have both chemical and mechanical origins and manifests itself by capacity loss, power fading or both. Mechanical degradation mechanisms are associated with the volume changes and stress generated during repetitive intercalation of Li ions into the active material, whereas chemical degradation mechanisms are associated with the parasitic side reactions such as solid electrolyte interphase formation, electrolyte decomposition/reduction and active material dissolution. In this study, the main degradation mechanisms in Li-ion batteries are reviewed.

Citation

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