

Enabling Competent Electrical Vehicles

Wenjuan Mattis, Yang Wu
Microvast Inc., full address

E-mail: WenjuanMattis@Microvast.com

Lithium-ion battery is very attractive system to power a new generation of clean electric vehicles. Battery life span, cost, and safety are still major barriers. The instability of the charged cathode and anode significantly affects the safety of lithium ion batteries. This key safety barrier can be overcome by understanding the role of each components on the safety of high-energy lithium ion battery and can be mitigated at both the cell and the pack level. In this talk, we will disclose the reason behind each cell components (cathode, anode, binder and electrolyte) on the safety of lithium battery. This include the cause of safety on NMC and NCA cathode, the role of the SEI on safety on the graphite anode and how coating can impact the safety of this anode. We will also describe a new nonflammable electrolyte that not only is nonflammable in the liquid phase but also during venting. We also describe the role of a novel aramid separator that has very high shrinking temperature tolerance of over 300°C. The understanding of the role of each components on safety and the use of nonflammable electrolyte and high temperature tolerant separator coupled with innovative cells and pack design can lead to a very safe high-energy lithium battery system.

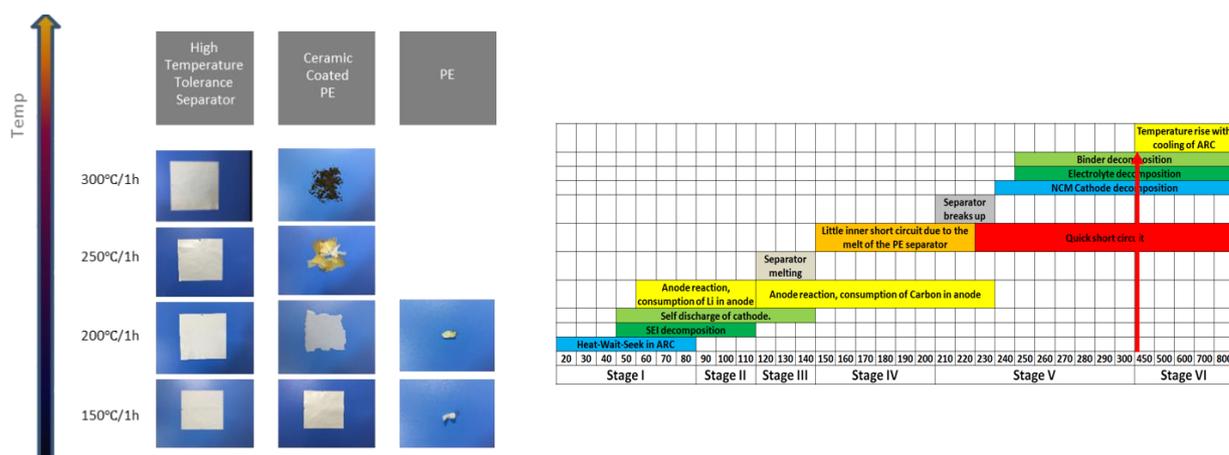


Figure 1: comparison of degree of shrinkage between PE , ceramic coated PE and Microvast Aramid separator at different temperatures. Aramid separator remains stable at 300°C, after high energy NMC material decomposes, greatly reduces the risk of thermal runaway. [1]

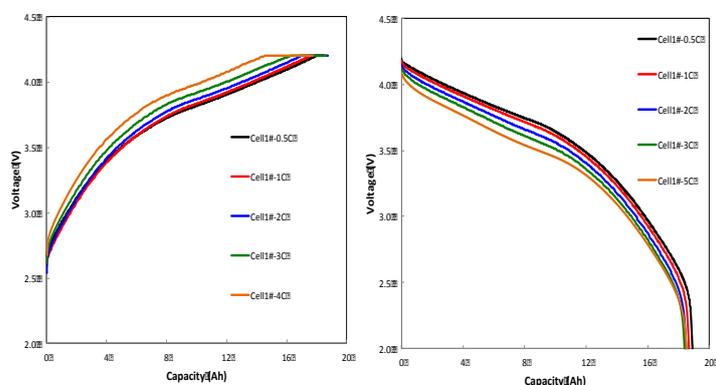


Figure 3: charge and discharge profile of NMC/graphite cell with Microvast cathode material, conducting carbon, electrolyte and separator at different rate capability.

References:

- [1] Xuning Feng, et al, J. Power Sources, 255: 294-301, 2014
- [2] Xuning Feng, et al, Appl. Energ, 154: 74-91, 2015