

## **On Measuring Energy from Li ion Batteries in Runaway and Combustion**

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Common methods to measure the energy output of batteries in thermal runaway will be discussed. Thermal runaway in Li ion batteries can be caused by several factors. In testing usually heat is used as a cause. Runaway can be initiated by oxygen generation from the cathode and then reacting with the electrolyte. The subsequent combustion causes an electrical discharge and several exothermic decomposition reactions. The total energy produced is that of runaway. Flammable decomposition products can then burn as combustion energy. The combustion energy has often been measured in the Cone Calorimeter. The runaway energy has been measured in FAA work by a battery calorimeter, but improved methods for measuring both components of energy have emerged from other FAA work. These methods will be described in a new study to develop transportation packaging to mitigate runaway accidents