

Causes of Thermal Runaway

Mechanical Abuse



- Crush
- Penetration

Electric Abuse



- Internal Short Circuit
- Over Charging
- Over Discharging

Thermal Abuse



- Overheating



Impact on Separator



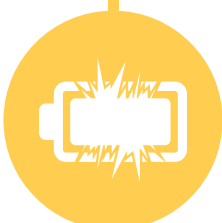
Deformation



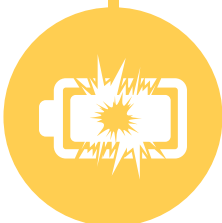
Separator Tearing



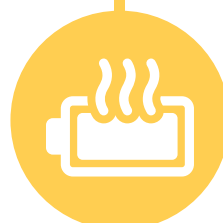
Dendrite Growth



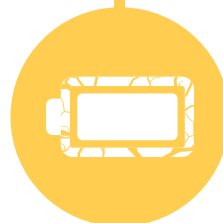
Piercing Separator



High Temperature

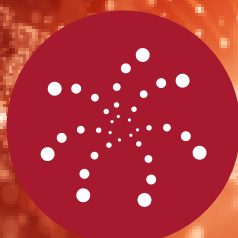


Collapse of Separator



Thermal Runaway

Dangerously High Temperature



Air, O₂
Release



Electrolyte Vapor,
Flammable Gases