

Volker Buchmann

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We make it safety



designs and development of emergency degassing and pressure compensation in Li-Ionen Batteries with new material and new perspectives to reduce the product costs and time to market

Suitable for:

- fluid cooled batteries (gas tight membrane)
- high safety application (totally closed after event)
- flat (down to 4mm)
- simply handling

Important aspect due to current events: Presentation of investigations that are important in order to secure the battery against water penetration in flood areas.

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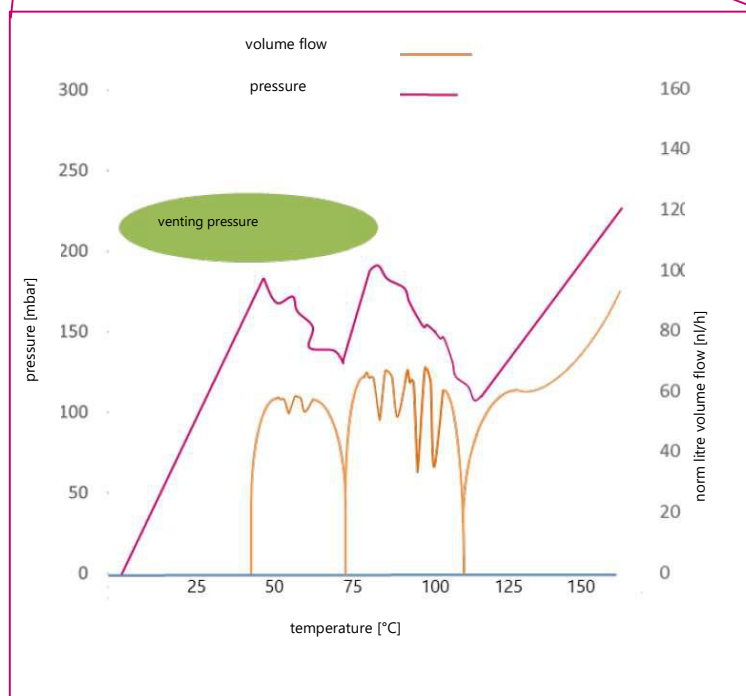
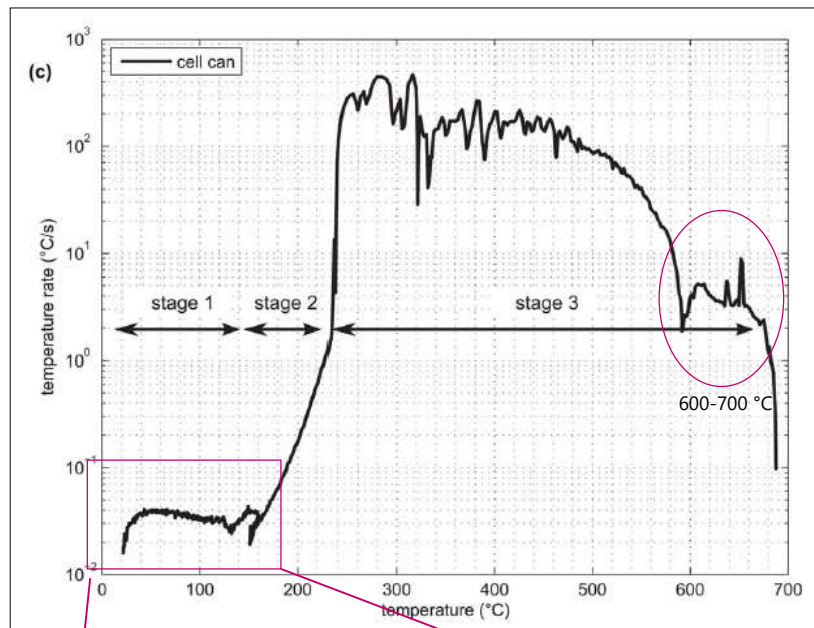
Safety-relevant components in the electric-vehicle?



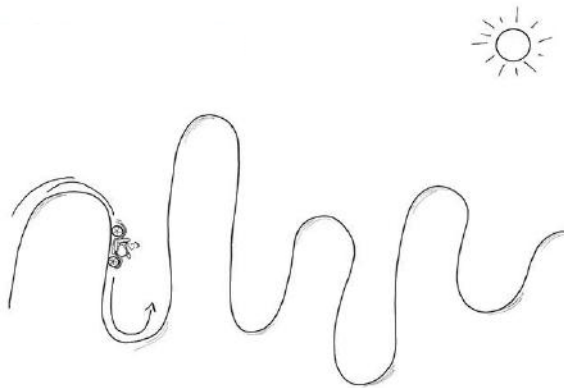
Safety in Li-Ion batteries



safety during thermal runaway



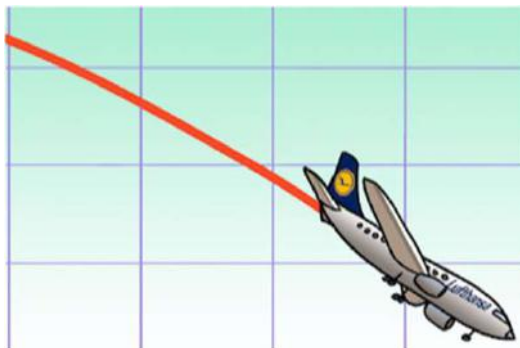
Safety with pressure compensation



Up and down hill tour



Sudden temperature changes



descent

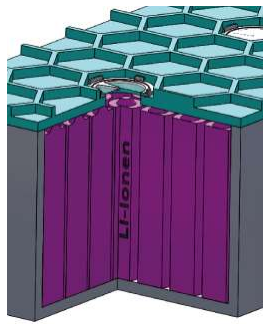


Barometric pressure or thermal pressure differences in the lower mbar range

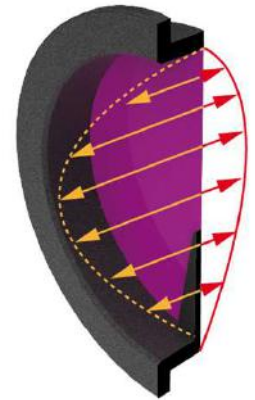
Safety in flood areas



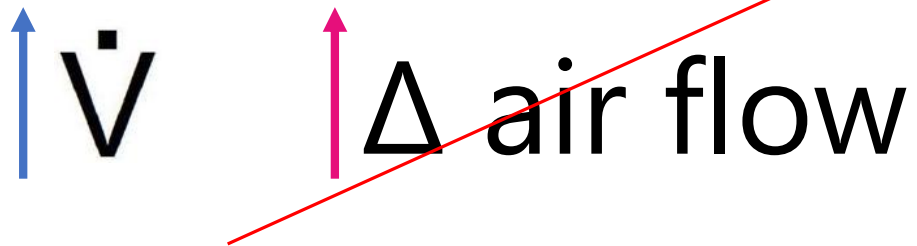
Safety with burst function

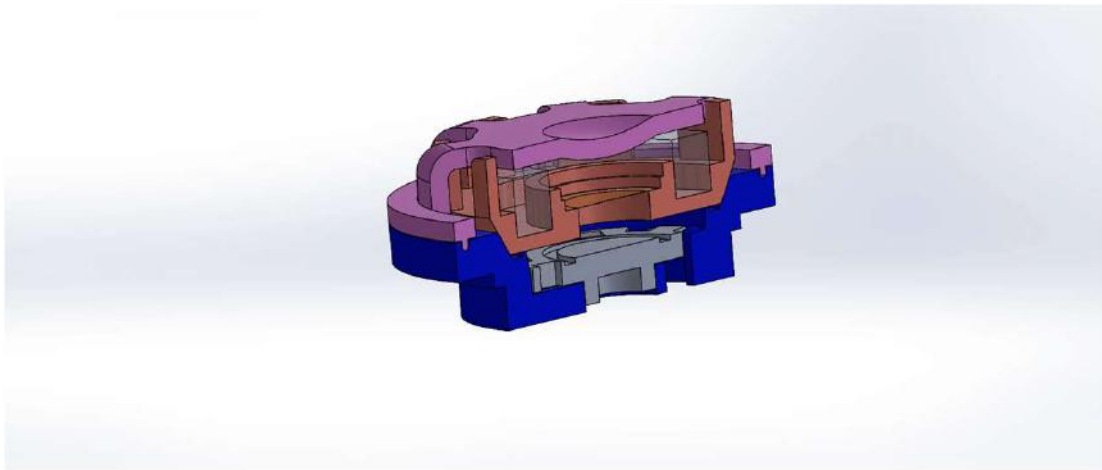


$$\Delta P_{\text{asymmetrical}}$$
$$\Delta \text{ air flow}$$
$$\dot{V}$$

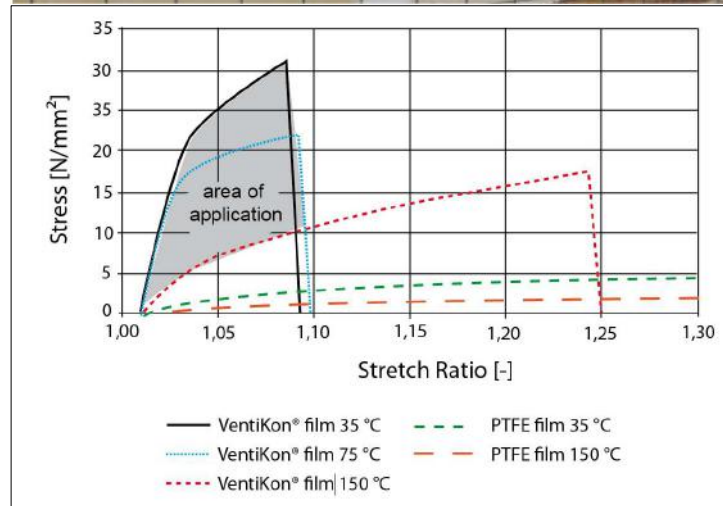


Safety after event and ready for the next

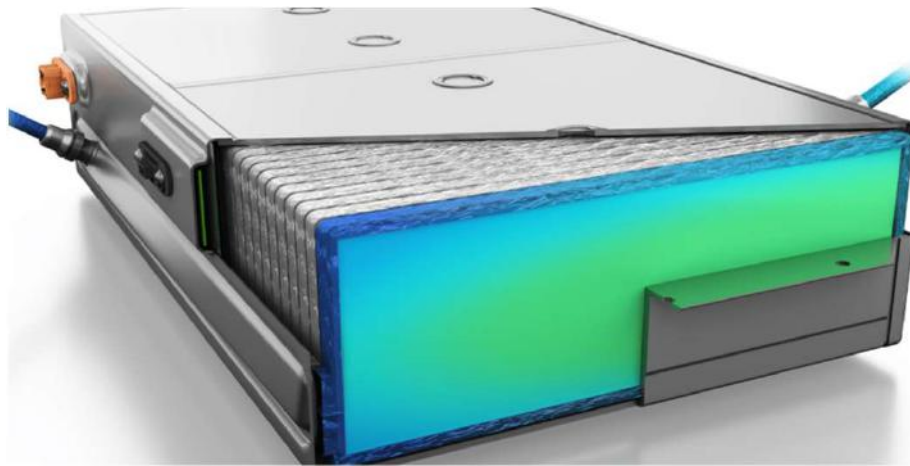

 \dot{V} Δ air flow



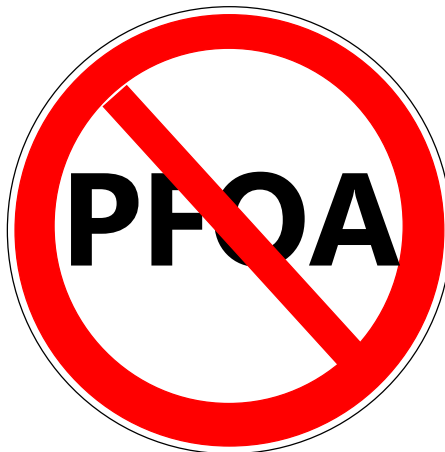
Safety with the right material



Safety in immersiv cooled batteries



Safety for the environment



How to design safety elements for Li-Ion batteries

