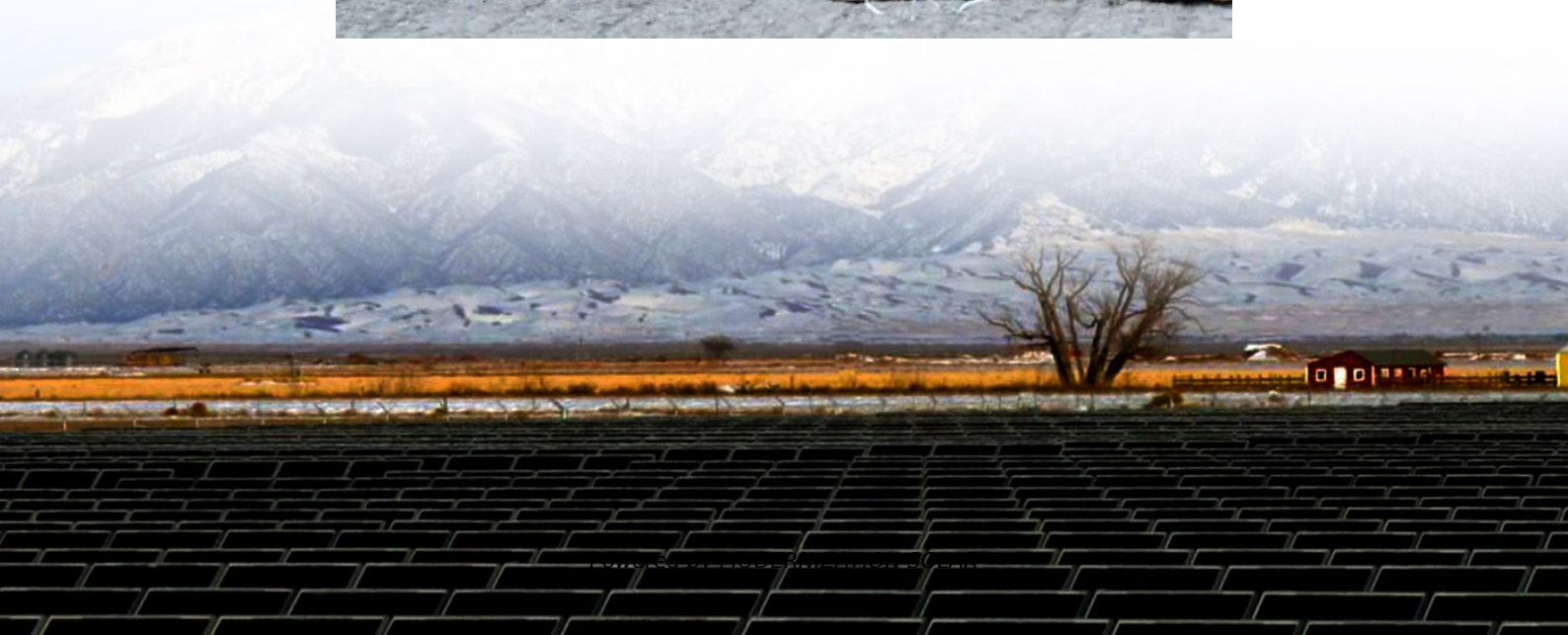


Energy Storage Firewall System





Overview

Cascaded thermal runaway (TR) propagation is the utmost safety issue for large-format lithium-ion battery (LIB) modules because of the high risk of system fires or explosions. However, quenching TR without si.

How much heating power does a firewall have?

The maximum heating power is up to 53 kW calculated by differentiating the temperature profile (Fig. S16) . However, the firewall successfully stopped the TR propagation by significantly reducing the highest temperatures to 660 °C with the help of the endothermic phase change process.

Are energy storage systems vulnerable to cyberattacks?

Energy storage systems (ESSs) are becoming an essential part of the power grid of the future, making them a potential target for physical and cyberattacks. Large-scale ESSs must include physical security technologies to protect them from adversarial actions that could damage or disable the equipment.

Are smart firewalls suitable for Next-Generation Lib packs?

Since the triggering temperature for protection is adjustable, our strategy for the design of smart firewalls holds enormous promise for next-generation safer LIB packs, and is also suitable for other practical applications with similar TR hazards, such as oil tanks, firefighting equipment, energy storage systems, and spacecrafts.

Can a smart firewall prevent tr propagation in high-energy battery modules?

The repeatability of the blocking effect was verified by another two similar groups of experiments (Fig. S18). Thus, a 1-mm-thick smart firewall with multilevel insulation mechanism can ensure the prevention of TR propagation in high-energy battery modules.



Energy Storage Firewall System



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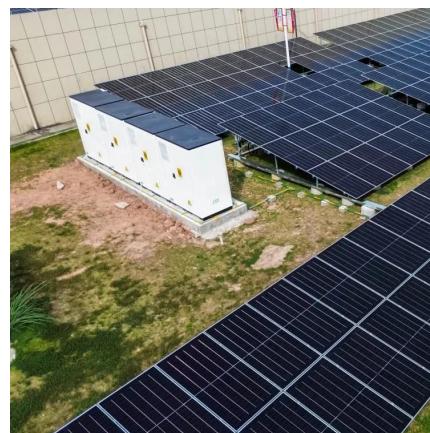
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Energy storage firewall construction

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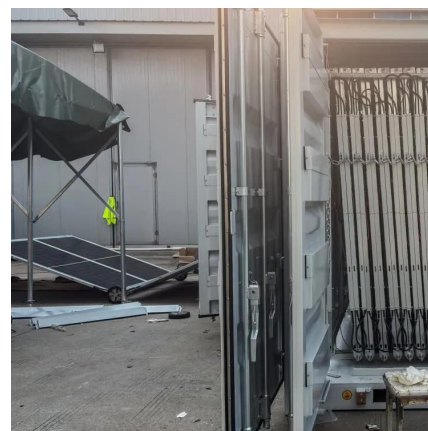


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