

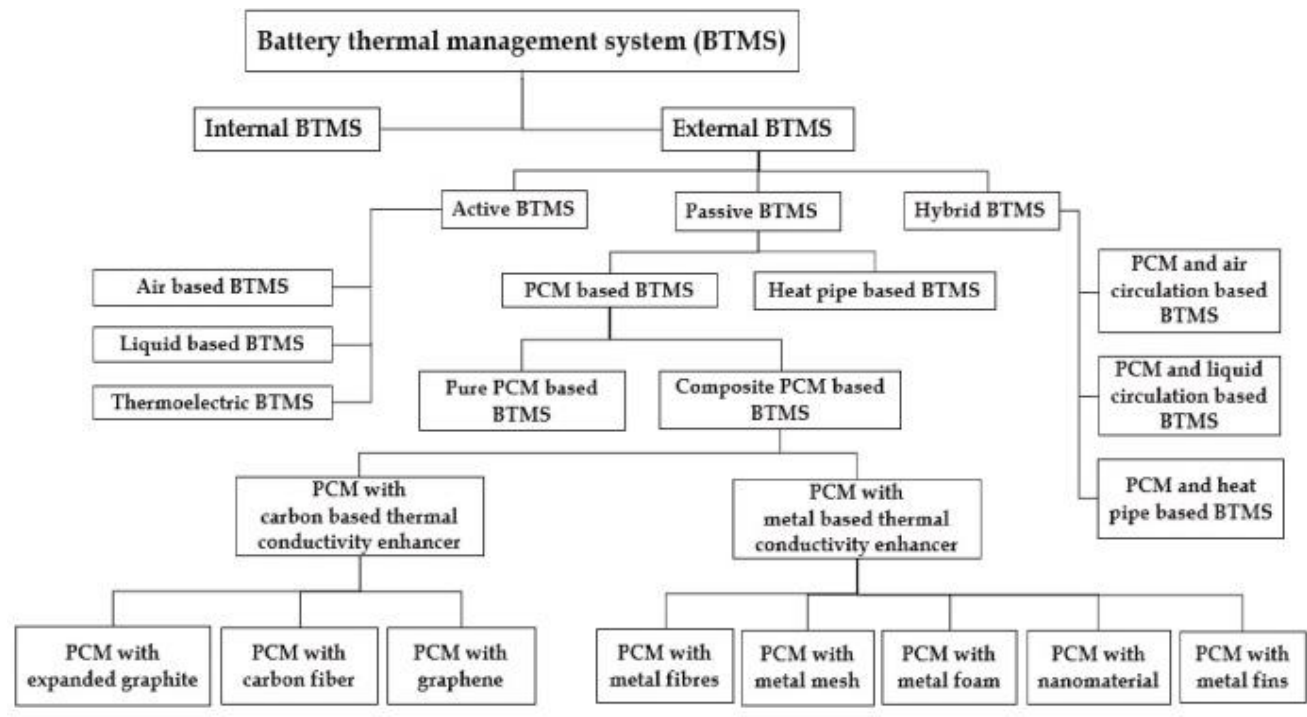
# BTMS Report

## **Problem statement**

- Thermal management remains a significant challenge due to the dynamic nature of battery behavior and the varying environmental conditions
- These challenges include temperature control, heat dissipation, and battery health monitoring.
- There is a need for a comprehensive thermal management system that can optimize the performance of the battery
- The system must be capable of regulating the temperature of Li-ion batteries within an optimal range to prevent overheating, and thermal runaway
- The system should be scalable, adaptable, and flexible enough to accommodate various battery chemistries, sizes, and configurations in different applications and environments.

## **Need of your Project**

- Battery thermal management systems are needed to ensure optimal performance and safety of batteries, especially in electric vehicles.
- The temperature of the batteries to prevent damage and improve efficiency
- Battery thermal management systems play a critical role in maximizing the performance, safety, and lifespan of batteries, particularly in high-demand applications like electric vehicles.



## Innovation solution for the problem statement

- To develop a battery and battery cooling system using a heat pipe System
- To optimize the heat in any situation
- By using of the cooling system reduces the heat in the battery through the heat pipe technology

## **Startups in our area**

1. Chroma ATE Inc.: A startup that provides battery simulation and testing services, including thermal management systems for batteries. Los Angeles, California
2. 24M Technologies: A startup that develops low-cost, high-performance lithium-ion batteries with advanced thermal management systems. Cambridge U.S
3. MAHLE GmbH: A German-based startup that provides innovative thermal management solutions for electric vehicle batteries. Stuttgart, Germany
4. Nuvation Energy: A startup that offers advanced battery management systems with thermal management capabilities for energy storage applications. Sunnyvale, United States
5. Viridity Energy Solutions: A startup that specializes in grid-scale energy storage systems with advanced thermal management for batteries. Oregon, US
6. Cadenza Innovation: A startup that provides lithium-ion battery systems with proprietary thermal management technology for various applications. Danbury, Connecticut
8. Enevate Corporation: A startup that develops advanced energy storage systems with fast charging capabilities and thermal management technology. Irvine, California, USA
9. Eberspächer: A German-based startup that provides heating and cooling solutions for battery thermal management systems in electric vehicles.
10. Pyrotek: A startup that offers innovative thermal management solutions for energy storage systems, including battery management for electric vehicles.

BTMS for utilizing multiple types of lithium batteries to develop battery packs

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Provider of energy management solutions for commercial and industrial solutions

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Designs smart energy storage systems

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Developer of safety technology for lithium-based batteries

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## Value proposition canvas

Customer Profile:

Customer Segment:

- Battery Manufacturers: Seeking efficient thermal management solutions.
- Electric Vehicle (EV) Manufacturers: Needing reliable battery cooling systems.
- Renewable Energy Companies: Requiring effective battery thermal solutions for storage.
- Consumer Electronics Manufacturers: Seeking improved battery performance.

Jobs to be Done:

- Battery Manufacturers: Ensure batteries maintain optimal temperature ranges.
- EV Manufacturers: Maintain battery efficiency and lifespan for vehicles.
- Renewable Energy Companies: Secure safe and reliable battery storage.
- Consumer Electronics Manufacturers: Enhance device battery longevity.

Pains:

- Battery Manufacturers: Complex integration of cooling systems into battery designs.
- EV Manufacturers: Overheating risks affecting vehicle performance.

- Renewable Energy Companies: Lack of efficient thermal management impacting storage systems.
- Consumer Electronics Manufacturers: Limited options for effective battery cooling in compact devices.

#### Gains:

- Battery Manufacturers: Streamlined integration, prolonged battery life.
- EV Manufacturers: Enhanced vehicle performance, prolonged battery lifespan.
- Renewable Energy Companies: Stable and safe energy storage solutions.
- Consumer Electronics Manufacturers: Improved device performance, longer battery life.

#### Value Map:

##### Products & Services:

- Heat pipe assisted cooling systems.
- Peltier cooling technology.
- Customizable thermal management solutions.
- Integration support for diverse battery setups.

##### Pain Relievers:

- Efficient heat dissipation, preventing overheating.
- Simplified integration reducing design complexities.
- Energy-efficient cooling, reducing power consumption.
- Ensured safety through precise temperature regulation.

##### Gain Creators:

- Prolonged battery life and enhanced performance.
- Flexibility in system integration for various applications.
- Optimized cooling leading to improved overall efficiency.
- Assurance of stable and safe battery operation.