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DEVELOPMENT| NPCC ensures stable & uniform temp significantly reducing battery overheating risks

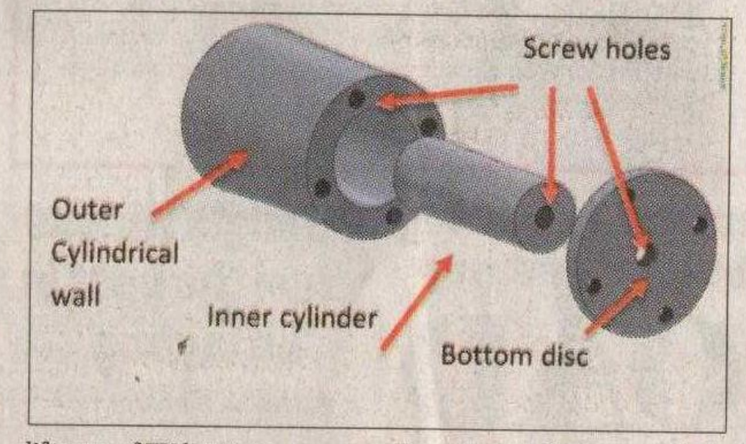
Revolutionary composite from IIT Indore boosts EV battery safety & performance

Our Staff Reporter
INDORE

Indian Institute of Technology Indore has developed a groundbreaking solution aimed at revolutionising thermal management in electric vehicles (EVs). Spearheaded by Prof Santosh Kumar Sahu from the Mechanical Engineering department, the project introduces a Novel Phase-Change Composite (NPCC) that dramatically enhances battery safety, performance, and lifespan, making EVs more reliable and efficient.

In EVs, maintaining an optimal battery temperature is crucial. When lithium-ion batteries overheat, they face severe risks like thermal runaway, which can lead to catastrophic failures. The NPCC developed at IIT Indore tackles this challenge head-on by ensuring stable, uniform temperatures, significantly reducing overheating risks. What makes this composite a game-changer is its unique blend of properties.

The NPCC offers improved thermal conductivity, shape stability, flame resistance, and electrical insulation essential for the safe operation of battery modules. Rigorously tested on both single and multi-cell battery modules, it has proven to substantially lower battery temperatures during charging and discharging, ensuring greater efficiency and extending the lifespan of EV batteries.



The composite is easy to manufacture, lightweight, and cost-effective, offering a superior alternative to traditional liquid-cooled systems that are heavy, complex, and require constant maintenance. The NPCC eliminates the need for pipes and pumps while providing exceptional heat dissipation and flame-retardant properties, adding an extra layer of safety for passengers.

IIT Indore director Suhas Joshi said, The technology has the potential to reshape the EV landscape. By managing heat more effectively, NPCC can extend the life of lithium-ion batteries, reduce the frequency of replacements, and cut operational costs for manufacturers and consumers alike. Environmentally, longer-lasting batteries translate to fewer raw materials needed for production and less waste, contributing to sustainability goals.

Sahu said, The impact of this innovation reaches far beyond EVs. With applications in renewable energy storage systems and other industries where thermal management is critical, the NPCC s versatility opens new avenues for improved energy efficiency and safety in a wide range of sectors. This technology is poised to significantly influence the electric vehicle industry, enhancing battery reliability and safety. Its adoption could accelerate the shift to cleaner transportation, reducing greenhouse gas emissions and fossil fuel dependence. As this revolutionary technology moves toward full-scale commercialization, it holds the promise of transforming not just EVs, but any application that requires effective thermal management.

This innovative material is already being prepared for commercialization, with Simple Energy Private Limited, Bangalore, securing the technology for use in their electric two-wheelers.