DST Institute partners with Industry for translating research on," Smarter Cooling of Aviation Batteries"

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A new partnership will now help translate fundamental materials research into robust, deployable thermal technologies for real-world aviation platforms.

Effective heat management remains a major bottleneck for high-energy-density lithium-based batteries used in aviation industry. Excessive heat generation during high-power operation can compromise efficiency, reduce battery lifespan, and pose serious safety risks. While passive thermal management strategies such as Phase Change Materials (PCMs) are attractive due to their low weight and zero power consumption, their widespread adoption has been limited by the inherently poor thermal conductivity of conventional PCMs. As a result, heat generated by the battery is not absorbed rapidly enough, leading to temperature rise and accelerated degradation of battery components.

A common approach to overcome this limitation involves incorporating high-thermal-conductivity additives to form composite PCMs. However, such composites often suffer from long-term stability issues, including additive agglomeration during repeated thermal cycling, which ultimately degrades performance and reliability.

A Memorandum of Understanding (MoU) was signed between Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous institute of the Department of Science and Technology (DST) and Dreamfly Innovations Pvt. Ltd, (a Bengaluru based company) working on thermal battery technology, to develop advanced thermal materials and thermoelectric devices for improving thermal management (storage and conversion) in Aviation batteries and address current challenges through materials-level innovation.

The joint effort combines JNCASR's strengths in materials design, synthesis, advanced characterization, and thermal transport measurements led by Prof. Kanishka Biswas's laboratory with Dreamfly Innovations' expertise in aviation battery engineering and system-level integration.

The advanced thermal materials will be engineered for high thermal conductivity to rapidly absorb excess heat during high-load operation, maintain battery temperatures within optimal operating windows, and enable lightweight, thermal regulation without compromising long-term stability.

This collaboration brings together academic research expertise from Prof. Kanishka Biswas lab in JNCASR and industrial innovation in Dreamfly to address critical challenges in drone performance, safety, and operational endurance.

Photo: MOU signing event between JNCASR and DreamFly

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