INTEREST EXPLORATION NOTE

TECHNOLOGY	FROM ISRO

SUPERCAPATTERY

Hybridization of battery and supercapacitor in a tandem arrangement boost the power capability while ensuring the full utilization of energy more efficiently with significant reduction in mass and volume. Supercapattery (= Supercapacitor + Battery) involves in-situ hybridization which enables direct integration of batteries (high energy density) and supercapacitors (high power density). This results in providing a complementary performance, filling the gap between the two technologies of both energy or power.

Indian Space Research Organization (ISRO) at its Vikram Sarabhai Space Centre (VSSC) has developed the innovative technology for processing Lithium Supercapattery (Hybrid capacitors) of various capacities viz., 0.5 Ah & 3.0 Ah at 4.0 V. This novel system invoking internal hybridization provides the advantages of Lithium battery as well as Supercapacitors to deliver sustained energy & power in a single system. Supercapattery is unique with advantages such as high energy/ power with low cost, safety, and environmental friendliness.

Salient Features

No.	Components	Description
1	Configuration	Cylindrical
2	Capacity, Ah	3.0 (1C - rate)
3	Operating voltage, V	4.0 - 2.8
4	Internal resistance, mΩ	10, Nominal
5	Pulse discharge	> 50 C rate
6	Self-discharge, mV	≤ 90 (for 30 days)
7	Mass, g	150, Typical
8	Operating temperature, °C	10 - 40, Nominal 5 - 60, Qualified for space application
9	Energy & Power density	> 80 Wh/kg, >2 kW/kg
10	Interconnections	Screw type

Supercapattery devices perform with operating voltage of Lithium ion system, ranging from 2.8 V to 4.0 V, while high pulse discharge capability of Supercapacitor (> 50 C) but with the high energy density (> 80 Wh/kg) and power density (>2 kW/kg). The system invokes the characteristics of electrochemical double layer (adsorption-desorption) as well as redox reactions for the charge storage. In addition, an excellent charge retention, low self-discharge and ability to survive extreme electrical, environmental and

mechanical conditions. The system is capable of sustaining extended cycles meeting various applications for Space systems viz., pyro, electromechanical actuators as well as commercial applications viz., electric vehicles, portable electronic devices and so on. This cost-effective technology will provide significant advantage due to reduction of mass and size of the battery systems.

Applications:

Aerospace: Delivery of peak / continuous current for ignition systems, separation systems, actuators etc.

Societal: Applications include in automotive industry, hybrid transportation systems, utility vehicles and powering electronic gadgets.

Technology transfer from ISRO

Currently, VSSC has established the technology in lab level with equipments and processes such as electrode processing (slurry, coating and compaction), dry room assembly, activation, formation and testing. Interested parties may scale-up the technology as per their interest and market demands.

ISRO is willing to offer the knowhow of this innovative technology to suitable entrepreneurs/ industries in India. Manufacturing industries interested in acquiring this knowhow may write with details of their present activities, requirements and plans for implementation, infrastructure and technical expertise available with them, their own market assessment, if any, and plans for diversification to the address given below.

For further details, please contact:

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