

## Press Note

# IIT Hyderabad Researchers' Metals CO<sub>2</sub> battery fetched prestigious Swarnajayanti Fellowship 2019-2020

***The proposed Metal-CO<sub>2</sub> battery with CO<sub>2</sub> as an Energy Carrier can play a pivotal role in India's 2024 Mars Mission and Clean Energy***

**HYDERABAD, 9<sup>th</sup> November 2020:** Indian Institute of Technology Hyderabad researchers Dr. Chandra Shekhar Sharma, Associate Professor, Department of Chemical Engineering and Creative & Advanced Research Based On Nanomaterials (CARBON) Laboratory has been awarded prestigious Swarnajayanti Fellowship 2019-2020 for his proposed work on Metals CO<sub>2</sub> battery. Dr. Sharma will receive due support from DST and SERB to further develop this concept which can play a pivotal role in India's 2024 Mars Mission and fixing the CO<sub>2</sub> emissions that cause global warming.

**Congratulating Dr. Chandra Shekhar Sharma on this notable recognition, Prof. B. S. Murty, Direction IIT Hyderabad Said,** *"It is a proud moment for IITH. It is one of the most prestigious fellowships of the country and I am delighted the IITH has entered into the top league with this achievement of Dr. Chandra. On behalf of the institute, I congratulate him for this achievement and wish him all the best in all his future endeavours. I am sure there are more such able faculty at the institute who can bring such laurels in near future."*

This work chosen for this prestigious fellowship has two major aspects. First, ***an appropriate energy storage system especially suitable for the extreme environment*** which has always been a challenge for all space agencies including for Next Mars mission planned for 2024. Since Mars atmosphere primarily consists of CO<sub>2</sub>, the broad objective of this concept is to scientifically explore and develop a working prototype of Metal (M)-CO<sub>2</sub> battery technology to explore the feasibility of this technology in the Mars mission particularly for the surface landers and rovers by using the CO<sub>2</sub> gas (95.32%) abundantly available in its atmosphere. Development of Metal-CO<sub>2</sub> batteries will provide high specific energy density with the reduction in mass and volume which will help the reduction of payload mass and launch cost in planetary missions.

***A real battery prototype will be developed as an outcome of this fellowship and organizations ISRO and DRDO will be brought on board in the early phase of the project for timely inputs for indigenous battery development for the Indian space mission.***

The second important aspect of this proposal is to develop ***Metal-CO<sub>2</sub> battery technology also as a promising clean strategy*** for restraining the climate effects of CO<sub>2</sub> emissions on earth as we all know that it is one of the main reason or global warming. For traditional CO<sub>2</sub> fixation methods, large energy is required leading to more CO<sub>2</sub> emissions. Metal-CO<sub>2</sub> batteries have a great potential to offer significantly high energy density than the currently used Li-ion batteries and provide a striking option to fix CO<sub>2</sub> emissions & environmental protection also.

At the beginning of this year, Dr. Sharma has proven the concept by using candle soot carbon as a cathode and tested the coin cell as assembled in simulated Mars atmosphere. In this feasibility study, they observed that the cell performs significantly better in the Martian atmosphere as compared to pure CO<sub>2</sub> atmosphere. That's quite promising and encouraging. Based on these very initial result, they also filed an Indian

patent in May this year. ***This is a technical breakthrough which shows for the very first time the feasibility of such a concept in Mars atmosphere and is just published in an International Journal, Materials Letters, as a featured Letter.***

**Talking about the motivation behind this proposed work, Dr. Sharma who is also the Chairperson of Indian National Young Academy of Sciences (INYAS) said,** “There are challenges for the success of Indian space mission to develop indigenous energy storage devices. Basic fundamental understanding of new materials and their chemistry for energy storage therefore becomes of paramount importance. An investment in basic fundamental research today will lead to new technology for the future energy security of the country and this research proposal is a small step towards that. The outcome of this project will not only utilize the CO<sub>2</sub> atmosphere on Mars to develop more efficient energy storage systems for planetary missions but also facilitate in mitigating the global challenge of Climate change”

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### **About IIT Hyderabad**

Indian Institute of Technology Hyderabad (IITH) is one of the six new Indian Institutes of Technology established by the Government of India in 2008. In a short span of **12** years, the institute built on an imposing **570**-acre campus and has been ranked among the top ten institutes for four consecutive years in the National Institute Ranking Framework (NIRF) released by the Ministry of Human Resource Development (MHRD), Government of India. The Institute was also ranked under Top **#20** in the recent edition of Atal Ranking of Institutions on Innovation Achievements (ARIIA) introduced this year by MHRD to systematically rank all major higher educational institutions and universities in India on indicators related to ‘Innovation and Entrepreneurship Development’ among students and faculties.

IIT Hyderabad has close to **221** full-time faculty, **2,911** students of whom **20** per cent are women, nearly **200** state-of-the-art laboratories and five research and entrepreneurship centres. The Institute has a strong research focus with more than Rs. **500** crore of sanctioned research funding while PhD scholars account for about **30** per cent of total student strength. IITH students and faculty are at the forefront of innovation with more than **1,500** research publications and patent disclosures, **300** sponsored/ consultancy projects and **50** industry collaborations. IITH has MoUs with **50** universities in the U.S., Japan, Australia, Taiwan and Europe. IITH has been a pioneering change in pedagogy with fractal academic programs that atomizes course modules, encourage interdisciplinary learning, spanning innovative technology, fundamental science, liberal arts and creative arts like photography, theatre and painting.

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### **Please direct all media queries to:**

Mrs. Mitalee Agrawal | Public Relations Officer, IIT Hyderabad

Cell: [8331036099](tel:8331036099) / Email: [pro@iith.ac.in](mailto:pro@iith.ac.in)