

## An advanced asymmetric supercapacitor based on microcubical Pb@MnO<sub>2</sub> and PANI/GNP hybrids showing excellent electrochemical performances

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### Abstract

Metal Organic Framework (MOF) based super capacitor is one of the gifted energy storage devices for future portable electronics. Here, we report in detail the design and low-cost fabrication of an advanced asymmetric super capacitor (ASC) assembled with the prussian blue (PB)/MnO<sub>2</sub> (PB@MnO<sub>2</sub>) hybrid as the positive electrode and the polyaniline (PANI)/graphene nanoplatelets (GNP) (PG) hybrid as the negative electrode with aq. KNO<sub>3</sub> electrolyte. Both the electrodes were made by the coating of the respective electro active materials on the conducting stainless steel (SS) fabric current collector. The MOF based positive electrode, PB@MnO<sub>2</sub> hybrid was synthesized via reducing agent assisted chemical bath deposition of MnO<sub>2</sub> Nano layer on the faradaic PB micro cubes and shows an appreciable specific capacitance (C<sub>sp</sub>) of 608 F g<sup>-1</sup> at 1 A g<sup>-1</sup> current density and the as-fabricated PB@MnO<sub>2</sub>//PG ASC device furnishes favorable C<sub>sp</sub> of 98 F g<sup>-1</sup> at 1 A g<sup>-1</sup>. Moreover, this ASC device exhibits noteworthy energy density of 16.5 Wh Kg<sup>-1</sup> at the power density of 550 W Kg<sup>-1</sup> along with remarkable long cycling life (retention of 93% capacitance even after 4000 charge-discharge cycles). Thus, the obtained results manifest great potential of the ASC device for exploring state-of-the-art futuristic applications as an advanced energy storage system

### Biography

Amit Kumar Das was awarded PhD in August, 2019 from Indian Institute of Technology Kharagpur (IIT Kharagpur), West Bengal, India. Later on, he joined as a Postdoctoral Researcher on a project funded by National Research Foundation of Korea (NRF) in October, 2019 with Prof. Nam Hoon Kim and Prof. Joong Hee Lee at BIN Convergence Technology, Jeonbuk National University, South Korea and his current research works are mainly based on development of high-performance and durable nano-hybrid materials with various morphologies for electrochemical energy conversion and storage. He is also devoted to develop the state-of-the-art electrocatalysts for water splitting cells and methanol oxidation.



5<sup>th</sup> Global Innovators Summit | February 24, 2021

**Citation:** Amit Kumar Das, An advanced asymmetric supercapacitor based on microcubical Pb@MnO<sub>2</sub> and PANI/GNP hybrids showing excellent electrochemical performances, Innovators 2021, 5<sup>th</sup> Global Innovators Summit, February 24, 2021, Pages 11