Abstract

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Synthesis of cytidine monophosphate- assisted reduced graphene oxide (N, P-rGO) as electrode material for supercapacitor applications

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Abstract

In this work, nitrogen and phosphorus co-doped reduced graphene oxide (N, P-rGO) nanohybrids has been synthesized using one pot greener in situ method using cytidine monophosphate as a dopant/reducing agent. This material has been characterized by various techniques such as UV-Vis, Raman, FE-SEM, TEM and thermal methods (TGA). The stability of N, P-rGO as an electrode material and the high operational potential window of 2.7 V (from -1.4 to 1.3 V) was achieved in three-electrode setup after running 150 electrochemical cyclic voltammetry (CV) cycles in neutral WIS 17 m NaClO4 electrolyte. Two-electrode aqueous symmetric supercapacitor (SSC) (N, P-rGO//N, P-rGO), designed by using CMP-mediated N, P-rGO as electrode material in neutral WIS 17 m NaClO4 electrolyte provided a fairly high energy density of 42.2 Wh Kg-1 at a power density of 315.2 W Kg-1 at 0.7 Ag-1 with superior cyclic stability, making it sustainable for energy storage applications. The ClO4- anion has been suggested to act as an effective H-bond net-work breaker for the bulk water, thereby, enhancing the cell voltage to 2.7 V. To the best of our knowledge, this system demonstrates a very high cell voltage for N, P-co-doped reduced graphene oxide with a high energy density.

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Biography

Ikrar Ahmad received his M.Sc. (Chemistry) degree in 2014 from Gurukul Kangri University Haridwar, Uttarakhand. In 2017, he joined Indian Institute of Technology Roorkee, India under the supervision of Prof. Anil Kumar. Here, he is focusing on the development of electrode material(s) for designing supercapacitor for efficient energy storage applications.

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