**ABSTRACT**

Sodium ion based energy storage system is a rising alternative for imminent energy need. Especially sodium ion hybrid supercapacitors have attracted much attention because they store energy through battery-type anode and offer power by capacitor-type cathode. Accomplishing high energy and power densities in a single device is of significant interest, which can probably be done merely by making hybrid devices. Herein we have synthesized biomass (goat hair) derived activated carbon cathode with a high surface area of 2042 m2g–1 and MoO2@rGO composite anode materials. Goat hair, keratin rich biomass, has a great impact economically, and over 40 million tons per year is produced. Besides, reduced graphene oxide (rGO) has been used to facilitate the chemical stability, mechanical strength, and feasible pathway for electrochemical reactions of MoO2. Each electrode individually (half-cell) and combinedly (full-cell) showed good electrochemical performance which is almost equal to previously reported sodium ion based hybrid supercapacitors. This combination of supercapacitor can travel over the existing energy storage system to the next level