Green Nano Supercapacitors

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The purpose of this experiment was to determine if a viable homemade nano-based symmetric double layer supercapacitor (SDLS) can drive an Inductive load (Motor) after a quick charge at a low voltage for a number of charge-discharge cycles. The supercapacitor was constructed from assumed nano-based titanium dioxide as part of the electrode's active material, homemade graphene - prepared from intercalation of graphite powder, suspended in an acetone solvent and exfoliated with a sonicator. An environmentally safe electrolyte consisted of a variety of household salts dissolved in glycerine together with kitchen wipes as the separator and thin recycled Aluminium as current collector plates. The constructed homemade SDLS was charged at a constant voltage of one volt over a one minute interval followed by testing the discharging time of the SDLS driving a motor. After building and testing thirty five SDLS's merely twelve SDLS's gave measurable and acceptable results. Overcharging with a supply voltage above one volt degraded the aluminium plates. Overall the discharge time of the load increased with increased cycle numbers, except if the electrolyte was dried out, or if the aluminium plates were oxidized. On average the discharge time was taken for a voltage drop from 0.8 volts to 0.3 volts. A longer charging time resulted in a wider-ranging voltage drop and an increase in discharge time According to the results the tested SDLS could drive the motor longer than the charging time for several charge-discharge cycles, therefore my hypothesis was proven correct.

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