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Supercapacitor made from a flake of burnt coconut shell

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Development of supercapacitors attracts great deal of attention as they are more environmentally friendlier than batteries and admit extraordinarily large number of charge- discharge cycles, without an appreciable decrease in the performance. Almost all commercial supercapacitors are based on coconut shell charcoal, which possess many advantages compared to carbons derived from other forms biomass. The pore size distribution in coconut charcoal constituted of over 85% nano-pores (< 4nm) provides high surface area for accommodating ions to form double layers. Coconut charcoal is hardest form of biomass derived carbon, an attribute beneficial to purification by washing, activation and largely dust free powdering. The **conventional** methods of fabricating a supercapacitor involves a binder which leads to reduction of bulk electrical conductivity and blocking of pores, consequently reduction of specific capacitance. Hence attempts have made to devise binder-less supercapacitors. We have developed a deceptively simple method to fabricate supercapacitors using two flakes coconut charcoal. Few coconut shells are burnt in air and when the flames arising from combustion of volatile matter are nearly extinguished, the incandescent flakes are quenched with water. The flakes are then washed with water and digested with 1M sulfuric acid for two to three hours and washed with water. A handful of large size flakes are put into a crucible, heated at 900 °C for 10 mins and immediately quenched with distilled water. It is easy to identify large flakes (~ 1.5 cm^2), but most of them are warped. Using sand paper, it is possible to flatten and shape pieces of flake into rectangles approximately of the size 25 mm^2 and 1 mm thick. The supercapacitor is formed by sandwiching a filter papers between the shaped flakes, moistened with 1M sulfuric acid. The sandwich is pressed between Ti plates to form the electrical contacts and we were able to obtain a specific capacitance value of 13.5 F/g for this capacitor. We believe with further modification this method can be used to mass product supercapacitors.

Key words: *Supercapacitors, Activated charcoal, Coconut shells*