

Activated carbon fiber based on human hair to be used as supercapacitor electrode

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Carbon is the largest material used as electrode on advanced energy storage devices. The modern life style requires more energy, consequently more smart energy use and efficient devices are needed. The constant evolution of material technologies looking for green material and renewable raw material (minimal environment impact) to be use in sustainable energy storage is one of the most important subjects studied in recent years. The scientific and industry community are paying more attention in new forms of carbon such as nanotubes, graphene and activated carbon fiber (ACF). ACF has especial interest because is quite cheap and can be transformed into any textile form. On the other hand, ACF are normally produced from polyacrylonitrile that is an oil derivative. The propose of this work is to convert human hair into non-woven activated carbon fiber to be used as supercapatitor electrode. The human hair needs 4 stages to be converted into activated carbon fiber: textile manufacture, oxidation, carbonization and activation. The final material, activated carbon fiber hair (ACFH), is a hollow filament containing more than 90% of carbon with microporous and surface area higher than 1200 m²/g. The supercapacitor evaluation was performed in a Swagelock®-type cell system with 2 M of H₂SO₄ medium. The behavior of electrode was characterized electrochemically by galvanostatic charge/discharge curves, cyclic voltammetry and electrochemical impedance spectroscopy.