

Nitrogen doped porous carbon sheets using non-solvent induced phase separation for Supercapacitor Electrodes

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Porous carbon sheets have been widely used as electrodes for secondary batteries and super capacitors. Conventionally, activated carbon powders are bound together using a binder, which is inevitable to lose capacity per mass by the weight of the binder used. Therefore, fabrication of a free-standing electrode will soon lead to an increase in the capacity of the electrode. In addition, there have been previous studies that increase the capacity of the electrode due to the increase of the charge in the Nitrogen-doping in the carbon electrode. Therefore, we succeeded in producing a free-standing porous carbon sheet using non-solvent induced phase separation (NIPS) method. In addition, to increase the n-doping rate, a polyimide containing a large amount of n elements was selected as a precursor, and a melamine powder containing six N elements per molecule was added to maximize the N element. When the electrical properties were measured, the fabricated porous carbon sheets had a specific capacity of 176 F g⁻¹ at 1 A g⁻¹ (rate capability of 152 A g⁻¹ at 5 A g⁻¹), and showed 99.2% capacity retention over 10,000 cycles.