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Porous carbon derived from tea waste used at cathode material for high performance super capacitor

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In this study, highly micro porous carbon (TW-Car) was successfully synthesized using a facile procedure combining acid treatment with a carbonization process that uses waste tea leaves from spent tea bags as raw materials. The acid treatment not only promotes the efficient removal of unnecessary inorganic impurities but also increases the product porosity to enable synthesis of hierarchically porous carbon materials with various micro-, meso-, and macropores. When used as cathode material for Supercapacitors, TW-Car demonstrated a much higher discharge capacity than is theoretically possible using graphite 330 F g⁻¹ after the 100000th cycle at a rate of 20Ag⁻¹ and exhibited greater rate capabilities compared with those of carbonated products from tea waste without acid treatment. It was shown that the good electrochemical properties of TW-Car can be ascribed to large Brunauer–Emmett–Teller (BET) surface area, well-formed hierarchical pores, and the prevention of unexpected electrochemical reactions from the reduction of metallic atoms.