Preparation of High-Performance Multifunctional Carbon as Electrode for Supercapacitors using Recycling *Scutellaria baicalensis* Georgi Extracting Waste

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Recycling and reusing waste to lessen environmental impact has always been a hot topic in research. The residue of *Scutellaria baicalensis* Georgi were used in this paper to demonstrate a new process for manufacturing multifunctional carbon compounds. So far, the waste from extracting active compounds from *Scutellaria baicalensis* Georgi has been used as a raw material, using KOH as an activator and carbonization in a tube furnace at a high temperature to produce a multifunctional carbon material. However, the analysis of Raman, X-ray diffraction and X-ray electron energy spectroscopy, the results depict that the carbon material has been successfully prepared; SEM and BET characterization indicated that the material not only has a large specific surface area (1666.6 cm²/g), but also contains a lot of mesopores and micropores that can be used as excellent adsorption materials and carriers; after optimizing the preparation conditions. As a result of the electrochemical performance analysis, the carbon material has a specific capacitance of 223.6 F/g at 0.5 A/g in a 6 M KOH aqueous solution, demonstrating that it has excellent electrochemical performance and can be used as an alternative material for the preparation of high-performance supercapacitors. The synthesis of multifunctional carbon materials from the residual of *Scutellaria baicalensis* Georgi extract provides a strong approach to maximizing the value of *Scutellaria baicalensis* Georgi resources while lowering environmental impact and meeting green energy production needs.

Keywords: Baicalensis; Recycling; Multifunctional Carbon; Reduce environmental burden

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