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Preparing hierarchical porous carbon aerogels based on enzymatic hydrolysis lignin through ambient drying for supercapacitor electrodes

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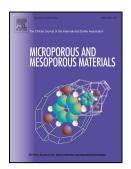
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ACCEPTED MANUSCRIPT

- 1 Preparing hierarchical porous carbon aerogels based on enzymatic hydrolysis lignin through ambient
- 2 drying for supercapacitor electrodes
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- 6 ABSRTRACT
- 7 Hierarchical porous lignin-based carbon aerogels, synthesized through a low-cost and simple method,
- 8 are promising for applications in supercapacitor electrodes. Lignin-based carbon aerogels are
- 9 prepared by pyrolysis and KOH activation of lignin-based aerogels. Lignin-based aerogels are
- prepared by mixing of enzymatic hydrolysis lignin (L), resorcinol (R) and formaldehyde (F) under
- 11 the catalysis of Na₂CO₃ (C) followed by gelation, aging and ambient drying process. The results
- show that lignin-based carbon aerogels with a L/(L+R) ratio of $\frac{20\%}{L}$, exhibit a high specific surface
- area of 779 m²/g, a large total pore volume of 0.48 cm³/g, and a large micropore volume of 0.29
- 14 cm³/g. The obtained lignin-based carbon aerogels exhibit an interconnected, hierarchical porous
- 15 network structure and a high degree of graphitization, which further contributes to their excellent
- electrochemical performance as electrodes in supercapacitors. The specific capacitance reaches
- 17 142.8 F/g at a current density of 0.5 A/g. Even at a large current density of 10 A/g, the specific
- capacitance of the CA-L20 electrode remains 112.5 F/g. After 2000 charge/discharge cycles, the
- specific capacitance still maintains 96% of its initial value, which indicates an excellent durability.
- 20 Keywords: Enzymatic hydrolysis lignin; Carbon aerogels; Ambient drying; Hierarchical porous

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