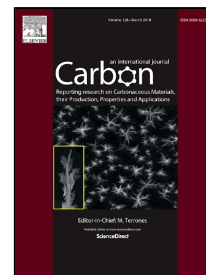


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# Nitrogen-containing novolac-derived carbon beads as electrode material for supercapacitors

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## Abstract

Nitrogen-doped porous carbon materials are interesting for energy storage via supercapacitors because they may improve the performance. We pyrolyzed and activated novolac beads in one single step with ammonia at different temperatures (750-950 °C), which leads to a highly porous carbon with nitrogen-doping. The chemical and physical properties were characterized and correlated with the electrochemical performance as supercapacitor electrodes. The average pore size varied at 0.6-1.4 nm due to the different synthesis temperatures, which allows to study steric hindrance effects of ions during electrosorption. Three different electrolytes (aqueous, organic, and ionic liquid) were tested. The specific capacitance in a symmetrical supercapacitor ranged up to 173 F·g<sup>-1</sup> and was strongly dependent on the porosity of the electrode material and the kind of electrolyte. We found that the presence of nitrogen group enhances the stability of a supercapacitor and led to a high specific energy of 50 Wh·kg<sup>-1</sup> with ionic liquid as electrolyte.

## Keywords:

porous carbon; nitrogen-doping; supercapacitor; electrochemical energy storage

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