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### Article

Bifunctional 3D n-doped porous carbon materials derived from paper towel for oxygen reduction reaction and supercapacitor

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**Article****Received 22-February-2018; Revised 8-April-2018; Accepted****10-April-2018****Bifunctional 3D n-doped porous carbon materials derived from paper towel for oxygen reduction reaction and supercapacitor**Xinyu Gao<sup>1</sup>, Xueyan Li<sup>1</sup>, Zhuang Kong<sup>1</sup>, Guozheng Xiao<sup>1</sup>, Ying Zhu<sup>1,2\*</sup>

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**Abstract:**

Designing and fabricating cheap and active bifunctional materials is crucial for the development of renewable energy technologies. In this article, three-dimensional nitrogen-doped porous carbon materials (NDPC-X, in which X represents the pyrolysis temperature) were fabricated by simultaneous carbonization and activation of polypyrrole-coated paper towel protected by a silica layer followed by acid etching. The material had a high specific surface area (1,123.40 m<sup>2</sup>/g). The as-obtained NDPC-900 displayed outstanding activity as a catalyst for the oxygen reduction reaction (ORR) as well as an electrode with a high specific capacitance in a supercapacitor in an alkaline medium. The NDPC-900 catalyst for the ORR exhibited a more positive reduction peak potential of -0.068 V (vs. Hg|HgCl<sub>2</sub>) than that of Pt/C (-0.121 V), as well as better cycling stability and stronger methanol tolerance.

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