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# Synthesis and Capacitance Properties of N-doped Porous Carbon/NiO Nanosheet Composites Using Coal-based Polyaniline as Carbon and Nitrogen Source

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**Abstract:** A novel synthesis approach of N-doped porous carbon (NPC)/NiO composites possessing some honeycomb-shaped nanoporous carbon and plentiful NiO nanosheets is exploited. First NPC/Ni composites are achieved with NPC yield of 52.9 % through a catalytic pyrolysis method, using coal-based polyaniline particles prepared by an in-situ polymerization method as a carbon and nitrogen source, and nickel particles as a catalyst, respectively. Next NPC/NiO composites are achieved unexpectedly with plentiful NiO nanosheets and N content of 1.00 wt% after a liquid oxidation process. In NPC/NiO composites, porous carbon mainly presents in the amorphous state, while the incorporated nitrogen mainly presents in the form of pyrrolic N (92.9 at%) and oxidized N (7.1 at%). Plentiful NiO nanosheets are embedded in the pores or on the NPC surface. 33.3 at% Ni<sub>2</sub>O<sub>3</sub> components exist in the surface of NiO nanosheets. NPC/NiO composites possess not only rich micropores, but also significant mesopores and nanoscale macropores. The BET specific surface area, BET average pore width and BJH adsorption average pore diameter are 627.5 m<sup>2</sup>/g, 2.0 nm and 5.1 nm, respectively. NPC/NiO composites demonstrate a high specific capacitance of 404.1 F/g at 1 A/g, and a good cycling stability maintaining

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