Hierarchical Interconnected Nanoporous Carbon derived from Polybenzoxazine for Gas Adsorption and Energy Storage

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Human civilization has brought tremendous global challenges to develop clean energy sources that can replace fossil fuels. Among various clean energy, gas energy and electric energy are the most feasible sources. The key element for these alternative sources is to develop an advanced storage media and many researchers have been working on porous solid adsorbents. Three-dimensional (3D) hierarchical nanoporous carbon is one of the materials that is a great candidate due to its unique and vastly tunable properties. By taking the advantage of molecular design flexibility of Benzoxazine chemistry, interconnected porous carbons with controllable morphology has been tailored through the sol-gel process. The ultra-microporous nitrogen-enriched carbons for CO_2 and CH_4 adsorption was successfully prepared through the one-step carbonization of a polybenzoxazine precursor. In case of the electrodes for supercapacitors, the relationships between the specific capacitance and pore structure of the nanoporous carbon electrodes derived from polybenzoxazines were investigated in 1.0 M of H_2SO_4. The results showed the highest specific capacitance was 372 F/g at 1 mV/s from 30% silica-templated Ethylene diamine (EDA) based polybenzoxazine derived nanoporous carbon due to its high specific surface area and optimized micropores and mesopores for electrolyte ions mobility and ions accumulations.

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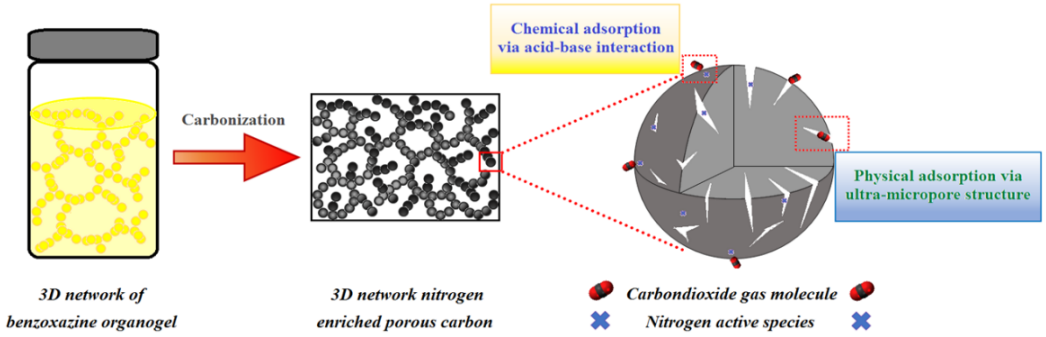

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