

Synthesis of nitrogen doped carbon material and its application for hydrogen storage

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Hydrogen energy is focused on as the most feasible energy in the future due to no pollutant emissions, high efficiency and infinite capacity. The hydrogen plan of DOE (Department of Energy of the United States) requires system weight efficiency of 6.5 wt% and system volumetric density of 62 kg H₂/m³. Many researchers have taken much interest in the nano-materials with a high surface area and adsorption energy as hydrogen storage materials. We also have focused on the carbon microspheres as high surface media and we have modified the carbon structure by heteroatom substitution like nitrogen. In our experiments, carbon doped nitrogen with high surface area was obtained from an ammonia gas treatment of the Resorcinol-Formaldehyde polymer which is formed in hydrothermal conditions without any other base catalysts. It has spherical porous morphologies with an over 1000 m²/g surface area. And it has around 5 wt% of nitrogen content in a carbon microsphere. Finally, hydrogen uptake shows 3.2 wt% in nitrogen containing carbon at 77K and 15bar, strongly depending on not BET surface area but nitrogen contents.