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Hydrogen Adsorption by High Surface Area Micro- porous Carbon Synthesized from Phenol-Formaldehyde QINGYUAN HU[1], Purdue University, GREGORY P. MEISNER, GM Research and Development Center — A high surface area microporous carbon material can be synthesized by mixing the activation reagent potassium hydroxide into a carbon precursor solution of phenol-formaldehyde oligomers. Some polymerization of the carbon precursor occurs during the initial mixing, and further polymerization is completed by heating to 160^oC. Carbonization and activation is accomplished by heating to 500^oC - 900^oC in an inert atmosphere. The porosity and surface area of the resulting carbon material depends predominantly on the amount of activation reagent added to the carbon precursor solution and on the carbonization/activation temperature and time. Optimized synthesis conditions yield a microporous carbon with a very high BET specific surface area of nearly 3000 m^2/g and a narrow pore size distribution. This new synthesis approach yields surface areas dramatically larger than those typically obtained by traditional chemical activation methods for porous carbon where solid carbon precursors are soaked in activation reagent solutions. Hydrogen absorption up to 5.75 wt% at 77 K and above 20 bars hydrogen pressure is observed for this new microporous carbon material.

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