

**A Study on the Effects of Pore Structures on Fractal
Characteristics of Meso-/Macroporous Carbons
Using Nitrogen Gas Adsorption Method**

질소가스 흡착법을 이용한 메조-/메크로다공성 탄소의 프랙탈
특성에 미치는 기공구조의 영향에 관한 연구

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The effects of pore structures on fractal characteristics of meso-/macroporous carbons were investigated using N₂ gas adsorption method. For this purpose, the carbon specimens were prepared by using furfuryl alcohol, C₅H₆O₂ and colloidal silica, SiO₂ sol solution as a carbonaceous precursor and silica template, respectively. The pore structures of the carbon specimens were controlled by varying molar SiO₂/C₅H₆O₂ ratio and pH of the initial solution mixture, respectively. From the analysis of pore size distribution (PSD) curves constructed from the N₂ gas adsorption isotherms, it was found that the carbon specimens are composed of meso-/macropores with different average pore diameter, d_{ave} , and standard deviation, σ , of the PSD. The surface fractal dimensions of the carbon specimens were determined from the linear relationship between $\ln V/V_{mono}$ and $\ln \ln (p^0/p)$ based upon a multilayer adsorption theory. The carbon specimen with larger value of σ of the PSD exhibited lower value of the surface fractal dimension. As a result, it is concluded that fractal characteristics of the carbon specimens are closely related to their pore structures, that is, as the silica-templated pores comprising the carbon specimen agglomerate, the surface fractal dimension of that pore surface decreases. In addition, the relative thickness of adsorbed molecule layers, which is calculated by the ratio of upper cut-off, z_{max} , to lower cut-off, z_{min} , of the fractal regime, increased with increasing both d_{ave} and σ of the PSD.

Reference

1. S.-B. Lee, S.-I. Pyun, and C.-K. Rhee, Carbon, 41 (2003) 2427.