초미세기공을 지니는 탄소분자체의 수소저장거동

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Preparation and Characterization of Ultramicroporous Carbons for Hydrogen Storage

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In this work, we prepared ultramicroporous carbons (UC) prepared by pyrolyzing poly(vinylidene fluoride) with different carbonization temperatures, and investigated the hydrogen storage behaviors. The surface functional groups and specific elements of UC were confirmed by Fourier-transform infrared spectroscopy (FT-IR) and X-ray photoelectron spectroscopy (XPS), respectively. Textural properties were analyzed using N_2 adsorption isotherms at 77 K. The hydrogen storage capacity of the UC samples were investigated by BEL-HP at 298 K/10 MPa. From the results, it was found that the hydrogen storage capacity was enhanced with increasing of specific surface area, resulting from the formation of ultramicropore on the UC.

Key words : Ultramicropore(초미세기공), Hydrogen storage(수소저장), XRD(x-ray 회절분석)

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CGO 담지 귀금속 촉매를 이용한 DME 자열개질 특성 연구

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Experiment of DME autothermal reforming with CGO-based catalysts.

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DME is acronym of dimethyl ether, which is spotlighted as an ideal fuel to produce hydrogen due to its high hydrogen/carbon ratio, high energy density and easiness to carry. In this research, we calculated thermodynamic hydrogen (or syngas) yield from DME autothermal reforming and compared to other fuels. The reforming efficiency was about 80% above 700℃. Lower OCR has higher reforming efficiency but, it requires additional heat supply since the reactions are endothermic. SCR has no significant effect on the reforming efficiency. The optimized condition is 700℃, SCR 1.5, OCR 0.45 without additional heat supply. Comparing to other commercial gaseous fuels (methane and propane), DME has higher selectivity of H_2O and CO_2 than the others due to the oxygen atom in the molecule. To apply DME autothermal reforming to real system, a proper catalyst is required. Therefore, it is performed the experiment comparing various novel metal catalysts based on CGO. Experiments were performed at calculated condition. The composition of product was measured and reforming efficiency was calculated. The catalysts have similar efficiency at high temperature(~ 800℃) but, CGO-Ru has the highest efficiency at low temperature (600℃).

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Key words : Hydrogen production(수소생산), Dimethyl Ehter(디메틸에티르), autothermal reforming(자열개질), CGO-based catalyst(CGO 담지촉매)

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