수송 연료용 부분산화 개질기의 운전특성

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Operation characteristics of partial oxidation reformer for transportation fuels

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Partial oxidation reformer was fabricated and operated using commercial transportation fuels. Fuel injector and heating coil were used for fuel atomization and startup, respectively. The reformer was designed to produce syngas for 150~200W_e class solid oxide fuel cell. The reformer was operated in the O_2/C range between 0.6 and 0.8 while the capacity was fixed at 150W_e. The temperature range in catalyst bed was between 500℃ and 900℃. Only 83% fuel was converted to H_2, CO, CO_2 and CH_4 at the operating conditions. The lowest temperature increase to 700℃ when the reformer was operated at 200W_e, Although the temperature profiles was improved, fuel conversion was 88%. On the other hand, fuel was completely converted when micro-reactor operated at the same condition. This difference maybe due to aromatic compounds formation at homogeneous region. In addition, a significant amount of coke deposition was observed at vent line. Homogeneous reaction depends on the degree of mixing. For this purpose, two fluid nozzle and Ultra sonic injector were compared to investigate the effect of atomization. Sauter mean diameter(SMD) of Ultra sonic injector was lower than two-fluid nozzle at test condition. However, conversion efficiency and fuel conversion were not improved by using two-fluid nozzle. these results imply that the temperature of homogeneous reaction region should be controlled to prevent coke formation.

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Key words : Transportation fuels(수송 연료), Diesel(디젤), Gasoline(가솔린), Partial oxidation(부분산화), Reforming (개질기)

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화학적 활성화에 따른 Ni 담지된 흑연나노섬유의 전기화학적 거동

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Effect of Chemical Activation on Electrochemical behaviors of Ni-loaded Graphite Nanofibers

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In this study, we prepared the activated graphite nanofibers (A-GNFs) via chemical activation with KOH reagent. The effect of A-GNFs on the surface and textural properties of Ni-loaded graphite nanofibers (Ni/GNFs) was investigated by X-ray diffraction (XRD), transmission electron microscope (TEM), and Brunauer-Emmett-Teller (BET). The textural properties of samples were investigated by N_2/77K adsorption isotherms. The electrochemical performances were investigated by cyclic voltammetry. As a results, the electrochemical performances of Ni/GNFs were improved with usage of A-GNFs. This could be interpreted by the high specific surface area and large total pore volume of the A-GNFs.

Key words : Activated graphite nanofibers (흑연나노섬유), Chemical activation (화학적 활성법), Surface and textural properties (표면과 구조적 특성), Ni-loaded (니켈 담지), Electrochemical performance (전기화학적 거동)

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