

다단분리막 반응기에서의 메탄개질반응을 통한 수소생산

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We designed and prepared the multi-membrane reactor (MMR) for the direct production of hydrogen via an steam-reforming (SR) reaction of methane. In the MMR, the single modules consisting of the nickel metal catalysts and dense membrane were stacked to increase the hydrogen production capacity. The SR reaction was performed in the MMR for relatively high-pressure operation ranges and the methane conversion and hydrogen production rate were observed under various experimental conditions, with variables including the pressure drop across the membrane, temperature, S/C and GHSV. It was found that the high performance of the Pd-based membrane and the porous metal catalyst and their configuration in the MMR guaranteed high hydrogen production. For instance, the methane conversion, the rate of hydrogen separation and its purity were 75 %, 30.6 L/h and 99.95 %, respectively, under the experimental conditions of 540 oC, S/C=3.0 and del-P=20 bar.