

Fabrication and Characterization Analysis of La-Sr-Co-Fe-O Perovskite Hollow Fiber Catalyst for Oxygen Removal in Landfill Gas

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Abstract : The atmospheric concentration of greenhouse gas (GHG, Green House Gas) is increasing continuously as a result of the combustion of fossil fuels and industrial development. In response to this trend, many researches have been conducted on the reduction of GHG. Landfill gas (LFG, Land Fill Gas) is one of largest sources of GHG emissions containing the methane (CH₄) as a major constituent and can be considered renewable energy sources as well. In order to use LFG by connecting to the city pipe network, it required a process for removing impurities. In particular, oxygen must be removed because it can cause corrosion of pipes and engines. In this study, methane oxidation was used to eliminate oxygen from LFG and perovskite-type ceramic catalysts of La-Sr-Co-Fe-O composition was selected as a catalyst. Hollow fiber catalysts (HFC, Hollow Fiber Catalysts) have attracted attention as a new concept alternative because they have high specific surface area and mechanical strength compared to other types of catalysts. HFC was prepared by a phase-inversion/sintering technique using commercial La-Sr-Co-Fe-O powder. In order to measure the catalysts' activity, simulated LFG was used for feed gas and complete oxidation reaction of methane was confirmed. Pore structure of the HFC was confirmed by SEM image and perovskite structure of single phase was analyzed by XRD. In addition, TPR analysis was performed to verify the oxygen adsorption mechanism of the HFC. Acknowledgement—The project is supported by the 'Global Top Environment R&D Program' in the 'R&D Center for reduction of Non-CO₂ Greenhouse gases' (Development and demonstration of oxygen removal technology of landfill gas) funded by Korea Ministry of Environment (ME).

Keywords : complete oxidation, greenhouse gas, hollow fiber catalyst, land fill gas, oxygen removal, perovskite catalyst

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