

Cascaded multi-stage membrane systems with sweeping flow for the post-combustion CO₂ capture

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One of the design options for improving membrane process is a sweeping method in counter-current module, with which driving force of permeating gas is increased due to reduction of permeating component concentration introduced by low concentration of retentate gas flow. In this study, we developed in-house membrane model with sweeping option in MATLAB®. We studied all the configurations of sweeping process from multistage network. All of the sweeping designs of multi-stage process layout were ranked with systematic economic analysis tool which considered main equipment capital cost(compressor, vacuum pump, expander etc), and operating cost(steam and electric usage). Furthermore, optimization by GA is carried out for a few promising membrane configurations with sweeping, leading to reducing cost of membrane systems and determining optimal design parameters. This research was supported by the Korea Carbon Capture & Sequestration R&D Center(KCRC) through the National Research Foundation of Korea (NRF) funded by the Ministry of Science, ICT and Future Planning (2014M1A8A1049305).