The design of automated process for multi-stage membrane system and the identification of optimal membrane performance

이성훈, 김진국[†]

한양대학교

(jinkukkim@hanyang.ac.kr[†])

A systematic framework to determine optimal membrane configuration and operating conditions in a holistic manner was developed under MATLAB® environment. Genetic Algorithm(GA) was applied to identify global optimum with an objective function composed of reliable cost basis. As a part of case study, this framework was applied to design membrane cascades for the coal-fired power plant (600 MWe) with satisfaction of 95 % CO_2 purity and 90 % CO_2 recovery. Also, the introduction of Robeson upper bound correlation to the framework can provide appropriate membrane performance. As a result, it is proposed that membrane having minimum 4000 GPU and CO_2/N_2 selectivity 50 in a commercial scale module would be an optimal membrane performance. In addition, a case of the design with different membrane performance gave the combination of permeance preferred or selectivity preferred in each multi-stage membrane process.