Dynamic Analysis and Control of Post-combustion CO_2 capture process

정호원, 이재형[†]
한국과학기술원
(jayhlee@kaist.ac.kr[†])

Amine-based CO2 capture process is one of the mature and commercially promising CO2 capture technologies. Since Post-combustion capture processes are always connected to power plants under their operation, the operating conditions of the power plants directly affect the capture process. Meanwhile, the amount of power generation is flexibly determined by various factors such as changes of season, electricity demand and its price. Since such operating load transition in power plants varies the exhaust gas conditions such as the flowrate, composition and temperature, the integrated CO2 capture process must be able to keep the desired operating condition against these disturbances.

This work aims to analyze dynamic characteristics of the amine-based CO2 capture process via dynamic modeling and simulation. Considering reaction kinetics and their effects on mass transfer phenomena, a dynamic process model for MEA-based capture process is constructed in the gPROMS platform. With the dynamic simulations, the nonlinear behaviors of this process are analyzed. Based on the analysis, simple PI-controller schemes are introduced to reject the disturbances in effective manner as well.