Development of data-driven software-sensor for estimating key process components in an ammonia-based CO_2 capture process

장용수, 이민우, 이해우, 안치규, 김제영[1], 한건우[1], 박종문*
포항공과대학교; [1]RIST
(jmpark@postech.ac.kr*)

Carbon dioxide (CO_2) capture processes have been considerable attention in recent years as an effective method for reducing CO_2 emission in many industries. In the CO_2 capture processes, the main reactions consist of absorption and regeneration, which are highly dependent on type and dosage of the absorbent. An ammonia-based CO_2 capture process is advantageous over others because they consume less energy during the regeneration steps. However, the lack of understandings about the relationships between key process parameters makes the operation of ammonia-based process much more complicated. To solve these limitations, a data-driven soft-sensor was developed to estimate the concentration of key process components (OH^-, HCO_3^-, CO_3^{2-}) by utilizing other on-line sensors, such as pH, temperature, conductivity and CO_2 contents in the flue gas. Using the values obtained from these easily measurable sensors, various kinds of statistical algorithm were applied to determine the optimal regression method and the selected method was employed as a soft-sensing model, which show relatively acceptable accuracy.