Separation Techniques for the Production of High-Purity Hydrogen: Development of Sorption-Enhanced Reaction Processes and Hydrogen Selective Metal Membranes

이찬현, 조영석, 이기봉[1], 한종희†
한국과학기술연구원; [1]고려대학교
(jhan@kist.re.kr†)

Hydrogen (H_2) has drawn an increasing attention as an alternative energy carrier because it produces minimal pollutant emissions during conversion to other energy forms and has higher energy density than conventional fossil fuels. The mass production of H_2 are based on the catalytic gasification of biomass owing to maturity of the technology and favorable economics, but H_2 produced from gasification of the biomass feedstock contains a large amount of impurities. In order to utilize H_2 as an alternative energy carrier, one important criteria to consider is to separate H_2 from the mixture gas. As methods for H_2 purification, sorption-enhanced reaction concept, in which catalytic reaction and carbon dioxide removal by sorption are carried out simultaneously, has been applied to several processes and high-purity H_2 can be directly produced from a single reactor. In addition, dense metal membranes have been studied and developed to purify H_2. In this study, we introduce experimental results of sorption-enhanced reactions and H_2 selective membranes for high-purity H_2 production, and discuss how these technologies can be applied to industrial processes.