

Process Synthesis for Solid Oxide Fuel Cell Based Auxiliary Power Units System

김대욱, 장 홍, 최수향, 오지우¹, 배중면¹, 이재형[†]

KAIST 생명화학공학과; ¹KAIST 기계공학과

(jayhlee@kaist.ac.kr[†])

Fuel-cell-based auxiliary power units (APU) have the potential for both higher efficiency and lower emissions than current solution, idling, to produce electricity required for heavy-duty truck. Furthermore, there is a good fit between APU requirements and fuel cell system characteristics in terms of load requirement, and physical size and weight. For this application, solid oxide fuel cell (SOFC) and auto-thermal reformer (ATR) as pre-fuel processor is considered the most favorable combination for fuel-cell based APU. During the development of the corresponding system, it is important to improve individual unit, but process synthesis study of the whole system including balance of plant (BOP) is also important. In this study, the model of whole system including BOP was developed using gPROMS, and the comparison of several feasible configurations for SOFC-based APU was carried out by the developed model to find an appropriate configuration of the system maximizing efficiency. At that time, operating conditions of each configuration were optimized for the fair comparison.