

Optimal design of processing of microalgal biomass and its residue into biofuels and a variety of end-products

Muhammad Rizwan, 이재형*

KAIST

(jayhlee@kaist.ac.kr*)

Microalgal biomass is a potential feedstock for a wide range of end-products due to its high quantity of lipids, proteins and carbohydrates. The conversion of microalgal lipids into biodiesel along with the processing of its residue (lipid extracted microalgal biomass) into valuable end-products can improve the overall economics of microalgal biofuels. For this purpose, we propose an optimization model to find the optimal processing pathway for the simultaneous production of (1) biodiesel from microalgal lipids and (2) valuable end-products from the residue, which mainly consists of proteins and carbohydrates. This modeling approach includes the development of superstructure and the formulation of optimization model as mixed integer nonlinear programming (MINLP) problem. The optimization model is implemented on a specific case study to demonstrate its use and applicability for the synthesis and optimization of microalgae-based biorefineries.