

Techno-economic analysis and life-cycle assessment of 2,5-furandicarboxylic acid production for the sustainable bio-based plastics

김현우, 원왕연<sup>†</sup>  
경희대학교  
(wwon@khu.ac.kr<sup>†</sup>)

To date, global world has faced with significant environmental issues mainly due to thoughtless disposal of plastic waste. 2,5-Furandicarboxylic acid (FDCA), which is biomass-derived plastic monomer, can replace petroleum-derived terephthalic acid (TPA). In this study, we present the integrated process for the co-production of FDCA as a bio-based plastic monomer and 1,5-pentanediol as a high-value commodity chemical from lignocellulosic biomass by incorporating catalytic conversion and separation subsystems. The heat exchanger network is designed to reduce utilities consumption, thereby improving economics of the process. Through a wide range of techno-economic analysis and life-cycle assessment, the trade-off between economic and environmental impact is investigated by comparing biomass-derived FDCA and petroleum-derived TPA productions. These integrated economic feasibility and sustainability studies can provide reliable criteria to decision makers.