Biofuel and bioenergy production from brown algae through biochemical pathways

유 준†, Fasahati Peyman[1]
부경대학교; [1]부경대학교 화학공학과
(jayliu@pknu.ac.kr†)

This study evaluate the economics, energy, and greenhouse gas emissions for biofuel and bioenergy production from brown algae through biochemical pathways including sugar platform (SP), methane platform (MP), and volatile fatty acids platform (VFAP). In SP, carbohydrate part of biomass is hydrolyzed and saccharified to produce sugars, which are later converted to ethanol by fermentation bacteria. In VFAP and MP, anaerobic bacteria digests all parts of biomass including carbohydrates, lipids, and proteins to produce VFAs and methane, respectively. In VFAP inhibitors are added to fermentation reactor in order to block methanogens from further digestion of VFAs into methane. Later, VFAs are recovered and hydrogenated to produce mixed alcohols. In MP, methane is used as fuel source for steam production in a boiler and power generation in a turbogenerator. The three processes are rigorously simulated to evaluate the economics, energy efficiency, and GHG emissions of each process during operation. Results are used to understand the main challenges and obstacles for biofuel production from brown algae and also to identify the available opportunities for improving the economics of each process.