

Low-density magnetic flocculants for economically feasible microalgae harvesting

서정윤, 박진석, 김민정, 이규복<sup>1</sup>, 오유관<sup>1</sup>, 박승빈<sup>†</sup>

KAIST; <sup>1</sup>KIER

(SeungBinPark@kaist.ac.kr<sup>†</sup>)

Microalgal biofuel has received significant attention from relevant industries and academic specialists due to numerous advantages of microalgae such as inedibility, versatility, ability to mitigate CO<sub>2</sub>, fast growth, and high oil productivity. The harvesting and dewatering steps are the chief obstacles to realize the industrialization of microalgal biofuels. Among all harvesting and dewatering technologies, using magnetic particles as flocculants is regarded as the most effective method in terms of speed, efficiency, throughput, and energy consumption. Here, it is important to consider low-cost synthesis and efficient utilization of magnetic flocculants. Magnetic flocculants should have high harvesting capacity to use efficiently and decrease iron consumption. Larger magnetic particles are preferred to enhance detachment efficiency for reuse, inducing a reduction of harvesting capacity and excessive iron consumption. In this regard, low-density magnetic flocculants with large size are synthesized by introducing pores in magnetic particles via spray pyrolysis, thereby minimizing the weight of magnetic flocculants and iron consumption. The low-density magnetic flocculants would facilitate economically feasible microalgae harvesting.