

## CO<sub>2</sub>-induced Switchable Ionic Liquid for Lipid Extraction and Separation from Microalgae by Reversible Transition

당위양, 노경호<sup>†</sup>, Sile He

인하대학교

(rowkho@inha.ac.kr<sup>†</sup>)

Recently, utilization of microalgae as bio-energy source is limited due to the excessive cost and energy consumption in the process of lipid extraction and separation. A kind of CO<sub>2</sub>-induced switchable ionic liquid (S-IL) with a reversible hydrophobic-hydrophilic transition were prepared. The reversible transition mechanism of switchable IL is resulted by the reversible reaction between azole-based anions in S-IL and CO<sub>2</sub>, which resulted the formation of carbamate. After characterizing the structure and transition performance of S-IL, a novel extraction approach based on S-ILs was developed for lipid extraction from wet microalgae, which coupled the microalgae cell disruption, lipid extraction, separation and solvent recovery process without additional solvents. Highest lipid extraction efficiencies from wet microalgae were obtained by switchable IL, C<sub>6</sub>DIPA-Im, and the extracted lipids were recovered from extraction phase by simply bubbling CO<sub>2</sub>. In addition, the C<sub>6</sub>DIPA-Im maintained high lipid extraction efficiency within five times recycles. The S-IL based lipid extraction method provides a new strategy for sustainable bioenergy production scheme.