

A simple and cost-efficient method to separate microalgal lipid from wet-biomass by surface-energy-controlled membrane

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A novel surface-engineered membrane system was developed to efficiently separate lipid extract from microalgal wet-biomass by organic solvent without energy-intensive dewatering step. An exquisite control of the surface energy of the membrane was achieved by applying a functional initiated chemical vapor deposited (iCVD) polymer film conformally onto a robust steel use stainless (SUS)-based membrane. The interfacial energy between the pPFDMA-coated membrane and the target liquid components could explain the observed phenomena of the selective separation of the membrane. The separation performance of the membrane was excellent with high permeate flux, superb intrusion force, and the separation yield. After direct transesterification of lipid extract from wet-biomass, the developed membrane could separate all the converted lipid (FAME) in chloroform phase from water phase containing microalgal debris. The membrane-based lipid separation from microalgal wet-biomass clearly could help achieving cost-efficient biodiesel production from microalgae.