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Techno-economic assessment of microbial lipids based on volatile fatty acids substrate by oleaginous *Cryptococcus curvature*

Techno-economic microbial diesel production were assessed using commercial simulation software (SuperProDesigner, Intelligen.com) in terms of raw material cost, microbial lipid yield over substrate (g/g), lipid content of cells, bioreactor productivity and cost of downstream processing. The simulation shows that glucose is not suitable because of its high cost. Volatile fatty acids (VFAs) derived from low cost biomass were found to be the most suitable substrate since VFAs can be produced at lowest processing cost even from lignocellulosic biomass. For bioreactor productivity multi-stage continuous high cell density culture (MSC-HCDC) was employed, which gives high bioreactor productivity together with product titer. Current experimental product titer of 5 wt% needs to remove about 550 g water from the fermentation broth. Thermal methods require high energy consumption for simple evaporation, in terms of kwh/m3 water removal, 706 and 25 while only 4 or less is needed if osmotic pressure free ($\Delta\pi=0$) reverse osmosis is used. Also experimental of biolipid production kinetics of oleaginous C. curvature will be presented. At a VFAs cost of 150$/ton (biomass cost, 75$/ton, 50% yield) microbial diesel cost is estimated to be around 1.15$/L and 0$/ton VFAs gives a much lower cost. Further improvement of cells for higher VFAs yield from biomass and microbial lipid yield, and overproduction and secretion of lipids may cut down the cost further.

Biography

Ho Nam Chang has completed his PhD from Stanford University in Chemical Engineering (1971). After one year's postdoctoral studies from Iowa State University, he returned to KAIST, Korea in 1976, where he served for 39 years until his retirement in February 2015 (as Professor Emeritus). He has been continuing his work on microbial biodiesel and osmotic pressure using reverse osmosis in Pukyung National and Chungbuk National Universities for successful commercialization of microbial biodiesel from low cost biomass such as food waste. He has published more than 365 papers in reputed journals, 10,290 citations (h-index 56, Google scholar) and has been serving as Advisory Board Member of *Biotechnology and Bioengineering*, the best journal in Biotechnology (Engineering) area by Wiley-Blackwell.

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