Rittikorn Chainoy 2007: Xylitol Production by Liquid Emulsion Membrane-Encapsulated Cells. Master of Science (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor: Associate Professor Sarote Sirisansaneeyakul, Dr.rer.nat. 129 pages.

Two Liquid Emulsion Membrane (LEM) systems, i.e. liquid paraffin and soybean oil were developed for encapsulating *Candida mogii* ATCC 18364 cells, applying in xylitol fermentation process. A liquid paraffin LEM system was found to be optimal with using 6.0 % w/v span 80 emulsifier in the membrane phase and 0.4 % w/v tween 40 and span 80 (HLB 11) as a stabilizer in the outer phase. On the other hand, a soybean oil LEM system was optimized by using 5.0 % w/v lanolin emulsifier in the inner phase and more than 4.0 % w/v microwaxes as a stabilizer in the membrane phase. The ratio of the membrane to the inner phase (V_O/V_W) was attainable up to 1:2.5. This soybean oil LEM found to be stable longer than 7 days.

The soybean oil LEM, 5.0 % w/v each of lanolin and microwaxes was selected for encapsulating yeast cells. Due to the system stability, LEM with encapsulated cells were coated on the inner surface of silicone tube performing as a tubular loop reactor. The batch production of xylitol from D-xylose was conducted with broth recycle at controlled pH 6.0, 30 ◦C under aerobic (> 70 % DO) and oxygen limiting (30 % DO) conditions. With the phase ratio (V_E/V_M) of 1:4, xylitol productivity (dC_{xyt}/dt) and yield ($Y_{P/S}$) were 0.022 g l^{-1} h^{-1}, 0.49 g g^{-1} and 0.005 g l^{-1} h^{-1}, 0.52 g g^{-1}, which obtained under aerobic and oxygen limited conditions, respectively. At high cell density LEM (C_X = 15.31 g l^{-1}), volumetric xylose consumption and xylitol production were not increased under oxygen limited condition. This suggested that xylose transport through liquid emulsion membrane was diffusion limited. Therefore, the consumption of xylose could not be enhanced to improve the xylitol production.

___ / ___ / ___

Student's signature Thesis Advisor's signature