Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Poly(styrene-b-dimethylsiloxane-b-styrene) Membranes in Pervaporation for In Situ Product Recovery during Fermentation CHAEYOUNG SHIN, ZACHARY BAER, ALI EVREN OZCAM, DOUGLAS CLARK, NITASH BALSARA, University of California at Berkeley — In situ product recovery was investigated in fermentation experiments to enable the development of a continuous fermentation process. Our pervaporation membranes are based on poly(styrene-b-dimethylsiloxane-b-styrene) (SDS) block copolymers. Polydimethylsiloxane (PDMS) is the best known organophilic pervaporation membrane material and was utilized as the transporting phase for selective permeation of organic molecules. The polystyrene (PS) block added structural integrity to the membrane due to the high modulus of PS. SDS membranes were found to have both the enhanced robustness as well as comparable pervaporation performance to that of cross-linked PDMS membranes. The permeabilities of water and organic components through SDS membranes were studied to elucidate the sorption and transport phenomena in this system. Furthermore, experiments combining fermentation with pervaporation were performed, and continuous fermentation by using pervaporation as the sole means of removing products was successfully demonstrated for the first time.

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Date submitted: 13 Nov 2013 Electronic form version 1.4