

Abstract Submitted  
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**Self-consistent unstirred layers in osmotically driven flows** HENRIK BRUUS, KÅRE HARTVIG JENSEN, Department of Micro- and Nanotechnology, Technical University of Denmark, TOMAS BOHR, Department of Physics, Technical University of Denmark — It has long been recognized, that the osmotic transport characteristics of membranes may be strongly influenced by the presence of unstirred concentration boundary layers adjacent to the membrane. Previous experimental as well as theoretical works have mainly focused on the case where the solutions on both sides of the membrane remain well-mixed due to an external stirring mechanism. We investigate the effects of concentration boundary layers on the efficiency of osmotic pumping processes in the absence of external stirring i.e. when all advection is provided by the osmosis itself. This case is relevant in the study of intracellular flows, e.g. in plants. For such systems, we show that no well-defined boundary layer thickness exists and that the reduction in concentration can be estimated by a surprisingly simple mathematical relation across a wide range of geometries and Péclet numbers. This work is accepted for publication in *Journal of Fluid Mechanics*.

Henrik Bruus  
Dept of Micro- and Nanotechnology, Technical University of Denmark

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