From channel proteins to industrial biomimetic membrane technology

Biomimetic membrane technology, based on the use of nano-scale functional additives in the form of channel proteins or artificially made channel structures, represents an attractive way of optimizing membrane separation technology. However, the nano-scale nature of the additives inherently points to the challenge in up-scaling the membranes to square meter areas. Thus, the ability to up-scale the processes involved in manufacturing will be crucial for translating the protein/nano-science into technology. Here we discuss how highly selective aquaporin proteins can be used to enhance the performance of the classical thin film composite membrane, and how this can be used in relevant membrane elements and module form factors. A particular up-scaling challenge lies in securing large scale membrane protein production. We demonstrate our framework for making batch amounts which are compatible with the large scale production of biomimetic membranes for water purification based on the use of the E. coli expression system.

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