A PROTOCELL DESIGN FOR BIOACCUMULATION APPLICATIONS

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ABSTRACT
This article provides a specific example of recombinant cell and protocell technology, moving from what is presently known to suggesting how novel application of existing methodologies could be utilized to design a complex synthetic system in form of a self-sufficient light empowered protocell. A practical application of protocells using a primary example of desalination in water treatment is given, followed by a more general approach to bioaccumulation and bio-diagnostics, outlining the possibilities associated with applications of protocells. The key hypothesis is that the inside-negative electrochemical membrane potential generated by Cl^- pump activity via halorhodopsin could also be utilized to drive the accumulation of cations into a protocell. Thus, the functional expression of halorhodopsin could energize proton-coupled uptake of substances or metals through a selective cotransport channel for a number of applications in biotechnology, molecular medicine, and water biotechnology.

Keywords
Protocells, membrane potential, polymersomes, bioaccumulation, molecular medicine.