

## **Selective Permeability Function of Lysenin Channels**

### **Executive Summary:**

For any living cell to survive, it must be able to selectively pass certain ions through its membrane. These ions pass through ion channels. Creating functional ion channels is one of the greatest challenges for engineering artificial cell structures today. Currently, the two main methods of putting ion channels into artificial structures are not feasible because they are not self-inserting into membranes. In our search for a membrane transporter that would be feasible for artificial cell structures, we turned our attention to lysenin. Lysenin has many of the same features as ion channels, but it is self-inserting. However, to be a viable replacement for ion channels, a more complicated process than simply transport across the membrane had to be observed. Rather, a selective transport across the membrane had to be observed. We set out to conclusively add selectivity to the list of intriguing features of lysenin channels. We measured the selective permeability of lysenin by creating a gradient by which the ions would flow through an artificially created membrane. To do this, we put lysenin into the solution and as the ions passed from one side of the membrane to the other, lysenin self-inserted itself into the membrane. We tested the permeability by fitting our data with the Goldman-Hodgkin-Katz equation. From our data, we concluded that lysenin does in fact exhibit selective permeability. Potential applications exploiting not only this function, but also the versatility of the lysenin protein in general, could lead to advancements in the understanding of ion channels and permeability functions for use in modes of drug delivery, cell batteries, and any device that requires modulation of ion transport.