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AUBURN UNIVERSITY

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Reference: High Throughput
Patch Clamp

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High Throughput Patch Clamp

Overview

Auburn University is seeking a licensee or development partner for a patch clamp technique utilizing a laser source to generate a voltage across the membrane of target cells. This voltage generation allows for detailed studies of ion channel activity and throughput levels not currently achievable by other methods. This technology has potential applications in pharmaceuticals, biotechnology, neuroscience and nanotechnology.

Advantages

- Enables controllable and measurable generation of a voltage across a membrane, allowing for detailed studies of ion channel activity and function
- Use of light source enables high throughput patch clamp processing
- Planar patch clamp design allows inexpensive manufacturing of hundreds of individual platforms and for parallel use of other characterization techniques (e.g., microscopy, AFM)
- Base technology for generating a voltage across a membrane has additional potential applications such as energy delivery, switching and signal transmission in nanodevices

Description

Amongst other applications, patch clamp studies are commonly used to facilitate drug screening in the pharmaceutical industry, particularly in drugs that act by blocking or regulating ion channel activity to and from cells. For example, in a membrane in which a molecular channel or switch is held open when a specific analyte is bound, ion transport through the membrane is permitted when the analyte is bound, but is blocked when the analyte is not bound. If a voltage is applied across the membrane, a current pulse will be observed if ion transport occurs through the membrane, indicating an open channel and thus the presence of a binding event. Conversely, if a voltage is applied across the membrane and no current is observed (i.e., no ion transport through the membrane), a closed channel (and thus no binding event) is indicated.

Such studies of ion channels is currently very difficult, however, based on such factors as the small scale and high density of ion channels. Generating voltages across the membranes using conventional methods also proves problematic. The resolution of known addressable electrodes is poor, and manufacturing of an electrode system on the substrate surface would likely prove difficult and expensive. Also, voltage applied to a membrane in an electrolytic solution is typically conducted through the electrolyte along the membrane surface, rendering it difficult or impossible to address or map a specific location on the membrane.

The use of a laser source to generate the voltage difference eliminates these challenges, making these detailed studies much simpler. When combined with a planar patch clamp array, a level of high throughput could be reached that is not currently achievable, enabling more detailed studies under more conditions with increased statistical significance than previously possible. In addition, the base technology for generating a voltage across a membrane has additional potential applications such as energy delivery, switching and signal transmission in nanodevices.

Status

- Generating a voltage across a membrane with a laser source has been lab demonstrated
- A planar patch clamp system has been produced in the lab, producing a gigaseal
- Two issued US Patents: [6,788,071](#) and [7,807,042](#)

Licensing Opportunities

- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or a joint venture