



Patch Clamp Providing On-Chip Thermal Control

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing methods for fabricating patch clamps with a component that enables precise and rapid temperature control of cell membranes.

Overview

Approximately half of all diseases affect the function of ion channels in cell membranes. Testing the flow of ions and molecules through these membranes clearly is vital to drug discovery and research. Patch clamping is a well-known technique that uses micromachined chips or plates to seal in cell membranes and measure small electrical changes as ion concentrations vary.

For temperature-based experiments, the fluid bath surrounding the cell membranes can be heated. However, this process may be inexact and cause delay.

The Invention

A UW-Madison researcher has developed a patch clamp chip providing precise, localized temperature control of cell membranes.

The chip's temperature system uses a Peltier device, which is capable of heating or cooling depending on the direction of current flow. It is a semiconducting membrane and can be etched on a silicon wafer, separated and then bonded to the substrate of the patch clamp. Using techniques previously developed by the researcher, the sandwiched structure is exposed to laser radiation to drill a nanoscale pore.

Applications

- Temperature-controlled patch clamp plates for electrophysiology
- High throughput drug screening

Key Benefits

- More precise temperature control
- Rapid heating or cooling response
- Supports wider range of possible experiments
- Thermal component is readily wafer bonded.

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