LICENSING OPPORTUNITY: PRECISION TEMPERATURE CONTROL FOR NANOPORE SYSTEMS

DESCRIPTION

Problem

Traditional temperature control methods struggle to regulate heat at nanoscales, leading to inefficiencies in nanoscale experiments. Many existing systems lack the ability to rapidly adjust temperatures in a highly localized manner. This invention solves the issue by offering instantaneous and precise heating, improving the accuracy of nanoscale reactions. It also minimizes thermal interference, ensuring that only the targeted area is affected. As a result, researchers and engineers can conduct more reliable and controlled experiments in fields like biotechnology and nanomedicine.

Invention

This invention introduces a system for controlling the temperature of extremely small volumes, such as yoctoliter-sized spaces. It utilizes plasmonic nanostructures positioned near a nanopore, which heat up rapidly when exposed to laser light. This heating effect alters the ionic conductance along the nanopore, enabling precise temperature regulation. The system is designed to provide highly localized heating without affecting surrounding areas. This technology is particularly useful for applications requiring controlled molecular interactions at a nanoscale level.

BENEFITS

Commercial Application

This technology can be applied in biomedical research, particularly in DNA sequencing and molecular diagnostics. It has potential uses in drug development, where precise temperature control is crucial for studying molecular interactions. The system could also be integrated into nanofluidic devices, enhancing their efficiency in chemical analysis. Additionally, it may be valuable in materials science, aiding in the study of nanoscale properties. Industries focused on precision engineering and nanotechnology could benefit from this innovation.

Competitive Advantage

- Ultra-precise temperature control at the nanoscale level.
- Rapid heating response compared to conventional methods.
- Minimal thermal interference, ensuring accuracy in experiments.
- Compact and scalable design, making it adaptable for various applications.
- Potential for integration into existing nanopore-based technologies.

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