

REAL-TIME ANTIBODY THERAPEUTICS MONITORING ON AN IMPLANTABLE LIVING PHARMACY

Tech ID: 33777 / UC Case 2025-043-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Biologics are antibodies produced by genetically engineered cells and are widely used in therapeutic applications. Examples include pembrolizumab (Keytruda) and atezolizumab (Tecentriq), both employed in cancer immunotherapy as checkpoint inhibitors to restore T- cell immune responses against tumor cells. These biologics are produced by engineered cells in bioreactors in a process that is highly sensitive to the bioreactor environment, making it essential to integrate process analytical technologies (PAT) for closed-loop, real-time adjustments. Recent trends have focused on leveraging integrated circuit (IC) solutions for system miniaturization and enhanced functionality, for example enabling a single IC that monitors O₂, pH, oxidation-reduction potential (ORP), temperature, and glucose levels. However, no current technology can directly and continuously quantify the concentration and quality of the produced biologics in real-time within the bioreactor. Such critical measurements still rely on off-line methods such as immunoassays and mass spectrometry, which are time-consuming and not suitable for real-time process control.

UC Berkeley researchers have developed a microsystem for real-time, in-vivo monitoring of antibody therapeutics using structure-switching aptamers by employing an integrator-based readout front-end. This approach effectively addresses the challenge of a 100× reduction in signal levels compared to the measurement of small-molecule drugs in prior works. The microsystem is also uniquely suited to the emerging paradigm of “living pharmacies.” In living pharmacies, drug-producing cells will be hosted on implantable devices, and real-time monitoring of drug production/diffusion rates based on an individual’s pharmacokinetics will be crucial.

SUGGESTED USES

- » Real-time, in-vivo monitoring of antibody therapeutic production within bioreactors
- » Implantable living pharmacies

ADVANTAGES

- » 100× reduction in signal levels compared to the measurement of small-molecule drugs in prior works
- » Unique microsystem suited for in-line or in-vivo measurements of biologic quantity and quality

RELATED MATERIALS

CONTACT

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OTHER INFORMATION

CATEGORIZED AS

- » **Agriculture & Animal Science**
 - » Animal Science
 - » Chemicals
 - » Other
- » **Biotechnology**
 - » Health
 - » Other
- » **Engineering**
 - » Engineering
- » **Medical**
 - » Delivery Systems
 - » Devices
 - » Diagnostics
 - » Disease: Autoimmune and Inflammation
 - » Disease: Cancer
 - » Disease: Digestive System
 - » Other
 - » Research Tools
 - » Screening

» **Nanotechnology**

» Materials

» NanoBio

» Other

» Tools and Devices

» **Research Tools**

» Antibodies

» Other

» **Semiconductors**

» Other

» **Sensors & Instrumentation**

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» **Veterinary**

» Diagnostics

» Other

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