Silicon Hydrogel Contact Lenses with Embedded Assay Components for Tear Fluid Clinical Assays

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Field
- Medical diagnostics
- Patient monitoring
- Sports medicine
  Occupational health

Technology
- Non-invasive monitoring
- Clinical assays
- Biomarkers
- Medical diagnostics

Advantages
- Non-invasive
- Continuous monitoring

Status
Available for licensing

Patent Status
US 2023/0025694 A1
(pending)

UMB Docket Reference
JL-2021-074

External Reference
Smart Contact Lenses Market Size, Share & Trends Analysis Report," Grand View Research, Link

Summary
The "Silicon Hydrogel Contact Lenses with Embedded Assay Components for Tear Fluid Clinical Assays" patent describes an advancement in non-invasive medical diagnostics. It integrates clinical assay components into contact lenses for real-time tear fluid analysis, catering to the growing demand for continuous health monitoring. The global market for smart contact lenses is expanding rapidly, with this technology poised to address gaps in non-invasive health monitoring. Its potential applications span medical diagnostics, sports medicine, and occupational health.

Market
The "Silicon Hydrogel Contact Lenses with Embedded Assay Components for Tear Fluid Clinical Assays" represents an innovation with substantial commercial potential, particularly in the healthcare and wearable technology markets. This technology, which integrates assay components into silicon hydrogel contact lenses for real-time tear fluid analysis, aligns well with the growing demand for non-invasive and continuous health monitoring solutions.

The global market for smart contact lenses, a category under which this innovation falls, was valued at approximately USD 5.8 billion in 2021. It is projected to expand at a Compound Annual Growth Rate (CAGR) of around 10.4% from 2022 to 2028, according to Grand View Research. This growth trajectory is underpinned by the increasing prevalence of chronic diseases such as diabetes, where continuous monitoring is essential for effective management. The patented technology's ability to offer non-invasive, continuous monitoring of health parameters through tear fluid analysis positions it as a highly attractive product in this expanding market.

Current market trends further bolster the potential for this technology. There is a rising interest in personal health and wellness, coupled with a shift towards more personalized healthcare solutions. Advances in nanotechnology and biosensing, along with a growing preference for wearable health devices, are key drivers in this sector. Additionally, regulatory environments are increasingly favorable towards telehealth and remote patient monitoring technologies, which aligns well with the capabilities of the proposed smart contact lenses.

This technology addresses the need for more efficient, non-invasive methods for continuous health monitoring. Many existing health monitoring devices are either invasive or do not provide continuous data, creating a demand for solutions like the smart contact lenses.

Technology
The patent titled "Silicon Hydrogel Contact Lenses with Embedded Assay Components for Tear Fluid Clinical Assays" describes a novel integration of clinical assay components into silicon hydrogel contact lenses, enabling the detection and measurement of various analytes in tear fluid. The innovation lies in the contact lens's ability to continuously monitor tear fluid for specific biomarkers. Traditional methods of tear fluid analysis often involve invasive techniques that can be uncomfortable or impractical for continuous monitoring. By embedding assay components into a contact lens, this technology allows for non-invasive, real-time monitoring of tear fluid composition.

The key features of this technology include its non-invasive nature and the continuous monitoring capability. The contact lenses are designed to be comfortable and function like regular contact lenses while simultaneously analyzing tear fluid. This is achieved by integrating sensitive assay components into the silicon hydrogel material of the lens. These components react with specific analytes in the tear fluid, allowing for the detection and quantification of substances such as electrolytes, biomolecules, or glucose levels.

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One of the technical advantages of this technology is its potential for early detection of various conditions. By continuously monitoring the tear fluid, changes in the composition that could indicate a health issue can be detected promptly. This early detection is crucial in managing conditions like diabetes, where timely intervention can significantly impact patient outcomes.

The primary application of this technology is in the medical field, specifically in diagnostics and patient monitoring. It offers a non-invasive and efficient way to gather important health data through a medium that is already widely used – contact lenses. The secondary applications could extend to fields like sports medicine, where athletes' hydration levels and electrolyte balance could be monitored in real-time, or in occupational health, where workers in hazardous environments could benefit from continuous health monitoring.

The contact lenses are made from silicon hydrogel, a material commonly used in contact lenses for its comfort and oxygen permeability. The embedded assay components are designed to be biocompatible and responsive to specific analytes in the tear fluid.

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