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ANALYTE-SENSITIVE PROBES AND CONTACT LENS FOR DIAGNOSIS OF OCULAR PATHOLOGIES

Key Investigator
- Joseph R. Lakowicz
- Ramachandram Badugu
- E. Albert Reece

Field
- Medical diagnostics
- Ocular health monitoring

Technology
- Analyte-sensitive probes Fluorescence
- Non-invasive diagnostics
- Real-time monitoring

Advantages
- Non-invasive continuous monitoring
- Specific and sensitive detection
- Real-time data collection

Status
Available for licensing

Patent Status
US 2022/0050096 (pending)

UMB Docket Reference
JL-2019-091

External Reference
- Contact Lenses Market Size, Share & Trends Analysis Report (Grand View Research) Link
- Diabetes Devices Market Size, Share & Trends Analysis Report (Grand View Research) Link

Summary
The patent introduces a contact lens integrated with analyte-sensitive probes for diagnosing ocular pathologies through the detection of specific analytes in basal tears. This non-invasive, real-time monitoring technology has applications in medical diagnostics and biomarker detection. The market for such contact lenses is set to grow within the broader markets of continuous health monitoring and diabetes management devices, which are projected to expand significantly in the coming years due to technological advancements and increasing health awareness.

Market
The patented technology for analyte-sensitive probes in contact lenses is set to make a significant impact on two key market segments: continuous health monitoring and glucose monitoring. The continuous health monitoring market is rapidly expanding, with contact lenses offering a non-invasive method to monitor health metrics, tapping into the broader contact lens market valued at USD 17.14 billion in 2022. This market is projected to grow at a CAGR of 8.9% from 2023 to 2030, driven by an aging population and increasing prevalence of refractive errors.

In parallel, the glucose monitoring market is one promising market within the broader diabetes devices sector. The global diabetes devices market is valued at USD 28.1 billion in 2022 and is expected to grow at a CAGR of 7.5% from 2023 to 2030. This growth is propelled by the rising incidence of diabetes, technological advancements, and the growing obesity epidemic. Glucose-monitoring contact lenses represent a less invasive, more user-friendly solution for diabetes management, addressing a significant portion of this market.

The integration of health monitoring capabilities into contact lenses aligns with the increasing demand for personalized healthcare solutions. It offers the potential for real-time, continuous tracking of health conditions, which is particularly advantageous for chronic disease management. The commercialization of these contact lenses could revolutionize patient care by providing a seamless way to monitor health without disrupting daily life.

The anticipated growth in both the contact lens and diabetes device markets suggests a substantial opportunity for the patented technology. As healthcare continues to evolve towards more integrated and less invasive monitoring solutions, such innovations are poised to meet the needs of a wide range of consumers, from those requiring vision correction to individuals managing chronic conditions like diabetes.

Technology
The patent titled "Analyte-Sensitive Probes and Contact Lens for Diagnosis of Ocular Pathologies" represents has significant potential in the field of medical diagnostics. This technology is centered around a novel type of contact lens that is capable of detecting specific analytes in the basal tears of the eye, which can be indicative of various ocular conditions. The innovation lies in the integration of probe compounds within the contact lens material that respond to the presence of these analytes by changing their optical properties, particularly fluorescence.

The key features of this invention include a hydrophilic portion, an analyte-sensitive portion, a fluorophore portion, and a hydrophobic portion. The hydrophilic portion ensures compatibility with the eye's aqueous environment, while the hydrophobic portion facilitates binding to the contact lens material. The analyte-sensitive portion is designed to interact specifically with target analytes, and the fluorophore portion emits fluorescent light, the properties of which change upon binding with the analyte. This change in fluorescence can be detected and measured, providing a non-invasive method for diagnosing ocular pathologies.

Contact: Mark Wozniak
Mark.Wozniak@umaryland.edu
410-706-7293

University of Maryland, Baltimore
620 W. Lexington St., 4th Floor
Baltimore, MD 21201

The technical advantages of this system are manifold. It allows for real-time monitoring of ocular conditions, which is a significant improvement over traditional methods that may require invasive sampling or are not capable of continuous monitoring. The use of contact lenses for this purpose also means that the diagnostic process is unobtrusive and can be carried out without significant discomfort to the patient. Moreover, the technology has the potential for high specificity due to the design of the analyte-sensitive portion of the probe.

Primary applications of this technology are in the diagnosis and monitoring of ocular diseases. By detecting changes in the concentration of specific analytes in the basal tears, healthcare providers can diagnose conditions such as dry eye disease, diabetic retinopathy, or other disorders that may alter the composition of tears. Secondary applications could extend to research settings where continuous monitoring of tear composition is valuable, or even to non-medical applications where the detection of specific biomarkers is needed.

Materials and components of this technology include the contact lens material, which must be compatible with the embedded probes and comfortable for wear in the human eye. The probes themselves are complex molecules that include a fluorophore capable of emitting light at specific wavelengths when excited. Performance metrics for this technology would likely include the sensitivity and specificity of the probes to their target analytes, the stability of the probes within the contact lens, and the comfort and wearability of the lens.

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