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3D Printed Self-Monitoring Blood Glucose Test Strips

According to the World Health Organization (WHO), worldwide, there are 422 million individuals with diabetes mellitus (DM). The prevalence of DM continues to grow and is projected to be the seventh leading cause of death by 2030. Supplies and treatment of DM are expensive, costing individuals, on average, $13,700 annually. However, management of DM is the best method to reduce complications and death. Self-monitoring blood glucose (SMBG) test strips are an important, and widely used, component of monitoring and controlling DM. While SMBG strips are easy to use and provide fast results, at an average of $0.98 per strip, testing four to eight times per day can result in significant expenses.

Researchers at Arizona State University have developed a method and design of a reusable 3D printed SMBG test strip. Prototype sensors were printed and tested and accurately correlated current output to glucose concentration. Glucose could be detected at levels from 0 mg/dL to 400 mg/dL, with an R2-value as high as 0.9665, covering hypoglycemic to hyperglycemic levels. This technology creates an alternative detection method to the current market SMBG devices at a lower initial cost point while also allowing reusability.

The simplicity of these 3D printed SMGB strips offers support of a better and potentially transformative method of glycemic management.

Potential Applications

• Reusable SMBG devices

• Printed devices for detection of additional biomarkers for management of other diseases besides diabetes

Benefits and Advantages

• Can detect physiological glucose concentrations between 0-400 mg/dL

• Linear coefficient as high as 0.9665

• Allows individuals with diabetes to have a cost effective method of managing their disease

- o   Each sensor only costs $0.05 to print and use

- • High specificity and sensitivity

- • User-friendly

- • Reliable

- • Similar dimensions and features to existing SMBG strips to comply with current manufacturing standards

- • Rapid – can detect glucose within 13 second

For more information about the inventor(s) and their research, please see Dr. La Belle's laboratory webpage