

Abstract Submitted
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A Noninvasive In Vivo Glucose Sensor Based on Mid-Infrared Quantum Cascade Laser Spectroscopy ALEXANDRA WERTH, Princeton University, SABBIR LIAKAT, SRI International, LAURA XU, Yahoo Inc., CLAIRE GMACHL, Princeton University — Diabetes affects over 387 million people worldwide; a number which grows every year. The most common method of measuring blood glucose concentration involves a finger prick which for some can be a harrowing process. Therefore, a portable, accurate, noninvasive glucose sensor can significantly improve the quality of life for many of these diabetics who draw blood multiple times a day to monitor their glucose levels. We have implemented a noninvasive, mobile glucose sensor using a mid-infrared (MIR) quantum cascade laser (QCL), integrating sphere, and thermal electrically (TE) cooled detector. The QCL is scanned from 8 - 10 microns wavelength over which are distinct absorption features of glucose molecules with little competition of absorption from other molecules found in the blood and interstitial fluid. The obtained absorption spectra are analyzed using a neural network algorithm which relates the small changes in absorption to the changing glucose concentration. The integrating sphere has increased the signal-to-noise ratio from a previous design, allowing us to use the TE-cooled detector which increases mobility without loss of accuracy.

Alexandra Werth
Princeton University

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