Design of a novel electrochemical solid state nanopore sensor for medical applications

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We present a concept for novel electrochemical nanopore sensors for disease detection and monitoring. Barriers to access high quality, fast and reliable healthcare monitoring are global challenges that must be addressed. Chronic diseases, such as diabetes or multiple sclerosis (MS) constitute to be major causes of mortality and inevitably demand novel, high throughput, yet simple health care platforms. To contribute to the global research in digitalised personalised medicine, the proposed nanopore sensors combine the recent advancements in ion track technology, biochemistry, microfluidic systems, and lab-on-a-chip devices for the development of point-of-care, miniaturised and portable device prototypes for sensing of relevant biomarkers.

This research explores the utilisation of silicon dioxide as a platform for nanopore membranes. Our nanopore membranes provide a stable and robust platform, which allow easy functionalisation that can be incorporated into lab-on-a-chip devices with an excellent signal-to-noise ratio. Using different sensing mechanisms such as resistive pulse sensing and current rectification, we are aiming to reliably detect biomarkers related to diabetes and MS.