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## A computerized breath analyzer device based on a micro-nano-chip of VO<sub>2</sub> nanoparticles for personal pain-free determination of blood glucose levels in a type 1 diabetes mellitus patient

The present technology proposes a competitive solution in diagnosis of diabetes mellitus through exhaled breath. It is well known that acetone in human breath can be a biomarker and indicator of fasting and/or lack of insulin in the blood. In the present technology, a patented micro-nano-chip (Grant # US 9683957) is packaged around the pertinent electronics in order to present a complete device for diagnosis and routine monitoring glucose levels. The new solution is non-invasive and hence alleviates pain as well as opportunistic infection which lead to currently more than 2 million amputations per year worldwide. From the tests conducted on one patient for the months of November 2014 to January 2015 in a home with a type 1 diabetes patient, the present technology has been used to correlate its responses to human breath to the many parameters found in blood of such a patient. There is a positive correlation of between 94% to about 97% depending on whether the readings were taken in the afternoon or morning and whether it is pre-fasting or post-fasting period. The technology trademarked here as MAL4NanoSnifferTM can be presented as an alternative solution, among a few competitors, to the diagnosis of glucose levels in diabetes patients. The technology can easily be extended to diagnosis of other diseases such as lung cancer and renal failure. The paper also includes calibration efforts to have the analyzer to convert acetone responses into blood glucose taking into account humidity, temperature and pressure. Discussions on the role of gate voltage on the enhancement of the recovery rate of the nano-sensors are also included.

## Biography

Bonex Wakufwa Mwakikunga has his patent on the lateral-gate field effect transistor with drain-source inter-digitation (coined LaGIDDS-FET) granted in the USA (2017), China (2017) and South Africa (2016) after rigorous PCT reviews. He also has more than 100 publications in impactful journals, a basketful of PhD and MSc students graduated under him and technology demonstrations apart from having guided some of his colleagues now to being top researchers in CSIR and beyond. He conducts research on nano-materials and develops nano-devices for gas sensing, breath analysis and nano-lasing applications. This is to answer the call for monitoring of gas pollutants in the mines, environment and health sectors including nano-laser-based data communication/computing systems. His research interests have seeded large-funding-attractors such as the Nano-Micro Device Manufacturing Facility and the gas sensing programme.

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