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From single nano-wire nano-electronics through gas FETs to deployable portable industrial sensing devices

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From single nano-wire nano-electronics through gas FETs to deployable portable industrial sensing devices
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This presentation outlines the progress made since 2011 when the projects of building nano sensors at the CSIR in Pretoria started up to the present time (2015). The time line starts with our attempts to establish electrical contacts to single WO3 nanowires by focussed ion beam coating in Carl Zeiss SEM equipped with nano-manipulators [1]. Next are the attempts for on-chip growth SnO2 nanowires on Au patterned alumina substrates [2] and lastly the Au/Ti contacts to individual SnO2 nanowires by electron-beam lithography protocols [3]. All these approaches led to harnessing the nanowire devices into a micro-nano chip which became the first CSIR technology demonstration in 2013.
This demo has since been packaged into a complete breath analyser device which is now being tested in clinics where it is being calibrated to non-invasively monitor glucose levels in diabetic patients [4-6], formaldehyde and ammonia levels in renal failure patients as well as toluene levels in lung cancer patients; all this by simply analysing the patients' breath for the listed biomarkers.
[1] B W Mwakikunga, A micro-nano-chip platform for contacting nano-structures electronically for diverse applications
[2] Bonex W Mwakikunga, A field effect transistor and a gas detector including a plurality of field effect transistors, PA158013/P
[3] B W Mwakikunga, A field effect transistor and a gas detector including a plurality of field effect transistors, PCT/IB2014/061713 (revised edition re-submitted)

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