UNIVERSITY of SOUTH FLORIDA
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# Sniffing Out COVID-19

## A NOVEL NANOFILM DETECTOR SYSTEM

The research just getting underway by Drs. Sal Morgera, Steve Saddow, Arash Takshi and Ph.D. student Tiffany Miller focuses on innovation and basic research toward diagnostic solutions. Using our experience in the design of low-noise, highly sensitive electronic systems integrated with novel methods employing nano-film sensor arrays configured for detection of associated biomarkers of COVID-19, we will design and test an electronic nose system (affectionately called the USF "BullNose").

Many of the biosensors that are commercially available use electrochemical cells for detection (a number are optical and are not easily adapted to the problem at hand). In an electrochemical detection method, the electrode must be exposed to a solution containing the target biomolecule and wait for incubation. The electronic nose sniffing approach eliminates the need for using an electrochemical cell, and the response can be much faster. Sniffing methods for air quality (such as the JPL eNose or Cyranose) typically involve specialized modeling and are not conducive to accurate, robust, and rapid diagnostic testing of COVID-19.

Thus, there is a long felt, yet unfulfilled, need for an improved electronic nose capable of diagnostic point-of-care testing of breath for rapid diagnosis of COVID-19. Further, emergency use authorization has allowed the use of real-time reverse transcription polymerase chain reaction (rRT-PCR) testing to detect RNA from SARS-CoV-2 in nasal, nasopharyngeal, and oropharyngeal swabs from patients exhibiting symptoms of the virus. This diagnostic process requires costly materials and protocols and is subject to human error which may adversely affect the accuracy of the result. This further amplifies the need for an electronic nose sensor for detection of SARS-CoV-2 biomarkers in breath.

Such a system would be characterized by micro-pump intake, low-noise electronic circuit design; highly specific and sensitive detection nano-arrays; and advanced digital signal processing methods and would minimize excessive materials, equipment, and process steps (time) associated with current methods.