

# Rapid direct detection of SARS-CoV-2 aerosols in exhaled breath for point of entry screening

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the MIE biosensor<sup>1,2</sup>.

*Figure 4: Results of Clinical Research Study conducted at Washington University.* 37 patients with respiratory illness were tested. Data is combined from 1-2 breaths in a single box. Results show 95.5% Sensitivity and 94.4% Specificity for SARS-CoV2 over

**SUMMARY** 

# **TESTING PLATFORM - WORKING**

# **PLATFORM CHARACTERIZATION**

The testing platform integrates a **Breath Aerosol Collection** device and a Micro-immunoelectrode (MIE) biosensor.



**Biosensor Characteristics**: We tested the specificity of our MIE biosensor by comparing the peak tyrosine oxidation currents (I<sub>ox</sub>) for varying concentrations of SARS-CoV-2 and SARS-CoV-1 spike protein (Fig. 3A). The biosensor LoD was determined by sequential dilution of a purified inactivated SARS-CoV-2 stock solution and measuring the corresponding I<sub>ox</sub> values for different virus concentrations (Fig. 3B). System Performance: To evaluate our system performance (Fig. 3C), we aerosolized inactivated SARS-CoV-2 virions of three different variants: WA1, Delta, and Omicron (BA.1) in lab experiments to generate aerosols that mimic the size distribution of exhaled breath originating from the lower airways of lungs.





Figure 2: Schematic of (A) 3D Printed Breath Aerosol Collection Device and (B) Micro-immunoelectrode (MIE) biosensor

The following steps describe the working of our testing platform as a clinical diagnostic tool for detecting SARS-CoV-2:





Figure 3: MIE Biosensor characteristics and System performance for SARS-CoV-2 detection: (A) Specificity of the MIE biosensor tested with SARS-CoV-1 and SARS-ČoV-2 spike protein. (B) Biosensor sensitivity (or LoD) was evaluated by serial dilution of different SARS-CoV-2 variants. (C) Normalized

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- Y2X Life Sciences has an exclusive option to license the device technology and consulted during design stages of the device.

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#### oxidation current (I<sub>ox</sub>) measured by the MIE biosensor in lab experiments (D)

Viral RNA copies/mL determined using RT-qPCR for different aerosolized SARS-CoV-2 variants. (E) Virus aerosol recovery obtained in lab experiments.



