

Abstract Submitted  
for the 4CS21 Meeting of  
The American Physical Society

**InnovaBug – Handheld, Low-Cost, Rapid, Accurate, Small Fluid Volume Diagnostic (SFVD) Device for Pathogen Detection using Drops: Design and Proof-of-Concept** RILEY RANE, KARISHMA SIVAKUMAR, TANVI SATHISH, LAUREN PUGLISI, VISHESH AMIN, VIRAJ AMIN, VIDYA DESAI, ERIC J CULBERTSON, MicroDrop Diagnostics LLC, ROBERT J CULBERTSON, Arizona State University, NICOLE HERBOTS, MicroDrop Diagnostics LLC, ISIO2 TEAM — A third of blood cultures yield false positives for infection. The average hospital wastes over \$1M annually treating non-existent blood infections, leading to antibiotic-resistant bacteria and anxious testing. Cultures also require significant blood volumes, 10-30 mL and are often performed more than once in chronically ill patients and premature infants, leading to high rates of Hospital-Acquired Anemia. Culturing requires at least 72 hrs for results. InnovaBug is designed and prototyped as an accurate, rapid, low-cost, handheld, medical Small Fluid Volume Diagnostic (SFVD) device. Yogurt water is used as a model system for blood plasma, because its viscosity matches plasma and it offers various bacteria to identify and count. InnovaBug uses off-the-shelf microscope slides cladded with reflective Al, coated with a *super-hydrophilic* coating, and SYBR Safe Green fluorescent dye. Drops are applied and fluoresced via UVA. Pathogens can be identified rapidly by shape. Quantitative analysis of the ratio between green fluorescence intensity versus UVA excitation intensity is correlated to Colony Forming Units (CFU) counting, showing pathogens are detected via macroscopic DNA/RNA fluorescence.

Riley Rane  
MicroDrop Diagnostics LLC

Date submitted: 10 Sep 2021

Electronic form version 1.4