

LAB ON A CHIP APPLICATION DEVELOPMENT FOR EXPLORATION

Lisa Monaco¹, Scott Spearing¹, Andy Jenkins¹, Wes Symonds¹, Derek Mayer², Edd Gouldie², Norm Wainwright³, Marc Fries⁴, Jake Maule⁴, Jan Toporski⁴, and Andrew Steele⁴

¹ Jacobs Sverdrup - Marshall Space Flight Center Group, Huntsville AL, 35812, ² BAE Systems, Huntsville AL, 35812, ³ Marine Biological Laboratory, Woods Hole MA, 02543, ⁴ Carnegie Institution of Washington, Washington DC, 20005

NASA's Marshall Space Flight Center (MSFC) Lab on a Chip Application Development (LOCAD) team has worked with microfluidic technology for the past few years in an effort to support NASA's Mission. In that time, such microfluidic based Lab-on-a-Chip (LOC) systems have become common technology in clinical and diagnostic laboratories. The approach is most attractive due to its highly miniaturized platform and ability to perform reagent handling (i.e., dilution, mixing, separation) and diagnostics for multiple reactions in an integrated fashion. LOCAD, along with Caliper Life Sciences has successfully developed the first LOC device for macromolecular crystallization using a workstation acquired specifically for designing custom chips, the Caliper 42. LOCAD uses this, along with a novel MSFC-designed and built workstation for microfluidic development. The team has a cadre of LOC devices that can be used to perform initial feasibility testing to determine the efficacy of the LOC approach for a specific application. Once applicability has been established, the LOCAD team, along with the Army's Aviation and Missile Command microfabrication facility, can then begin to custom design and fabricate a device per the user's specifications. This presentation will highlight the LOCAD team's proven and unique expertise that has been utilized to provide end to end capabilities associated with applying microfluidics for applications that include robotic life detection instrumentation, crew health monitoring and microbial and environmental monitoring for human Exploration.