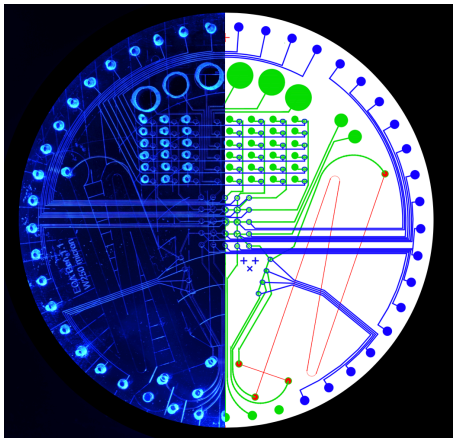
The sensitive organic detection levels needed for a meaningful measurement of biosignatures on Europa together with the challenging surface operational plan dictate that organic detection instruments must be very sensitive, compact, low mass and autonomously robust. MOAB is a microfluidic organic biomarker detection system for amines, amino acids, organic acids etc. that consists of a sample filter for melting /dissolving an ice sample, a Programmable Microfluidic Analyzer for low volume autonomous sample processing, and a LIF (laser induced fluorescence) detected microfabricated glass Capillary Electrophoresis system for molecular separation and analysis (developed using MATISSE funding). A composite image of the microfabricated processor is shown illustrating the fluidic design and resenting a picture of the functional microdevice (100 mm dia). MOAB analysis protocol is based on functional group specific labeling of organic molecules with fluorescent labeling reagents followed by high resolution CE separation. When coupled with LIF detection this process provides very sensitive (< 100 picomolar) detection limits which translate to the 1 nanomolar detection requirements of the Lander STM for organic molecules. The microfabricated CE system provides high specificity for molecular detection along with the ability to measure chirality of amino acids. MOAB is projected to be 4.2 kg, 4 L, and requires 170 Whr per sample.



The MOAB Technology Demonstration Unit (TDU) is being designed and built at SSL (MAVEN; Parker Solar Probe) in a flight-like format with materials and design that will be TRL 6 in 2021 and have a clear pathway to 7. Current engineering efforts are focused on accommodation within the Lander, especially sample transport, developing a ConOps Plan, a TMC Plan and MEL. Science efforts are focused on demonstrating ice sample filtration and transfer to the analyzer and on optimization of the autonomous organic analyzer separation performance. Thanks to NASA for ICEE-2 support 80NSSC19K0616.