

Sandia Automated Molecular Biology Platform:

Kamlesh (Ken) Patel

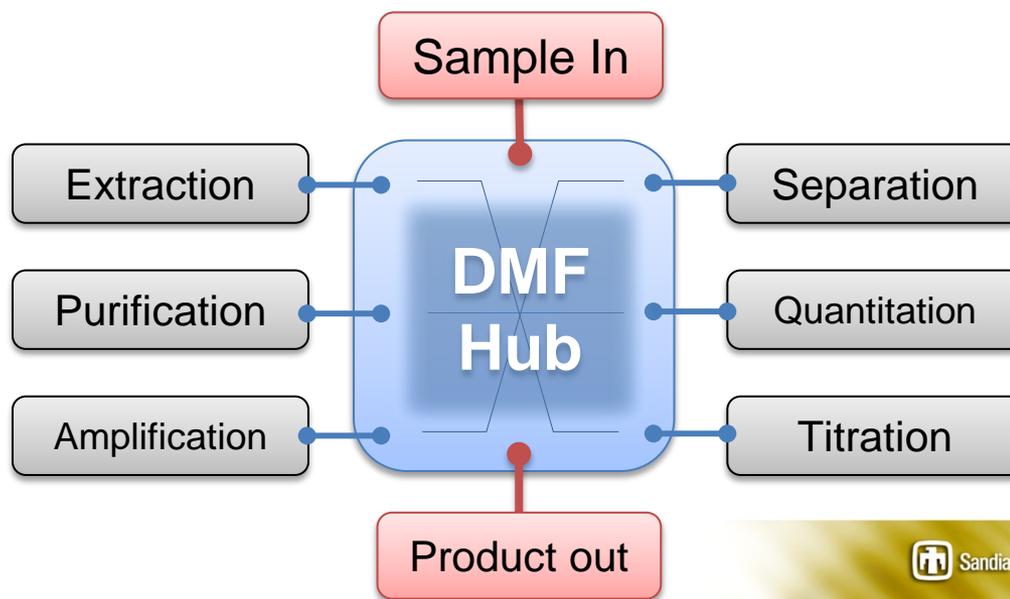
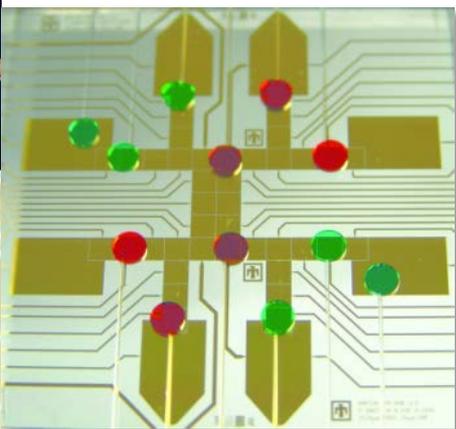
Manager

February 25, 2015

Sandia MedTech Showcase

Technology Overview

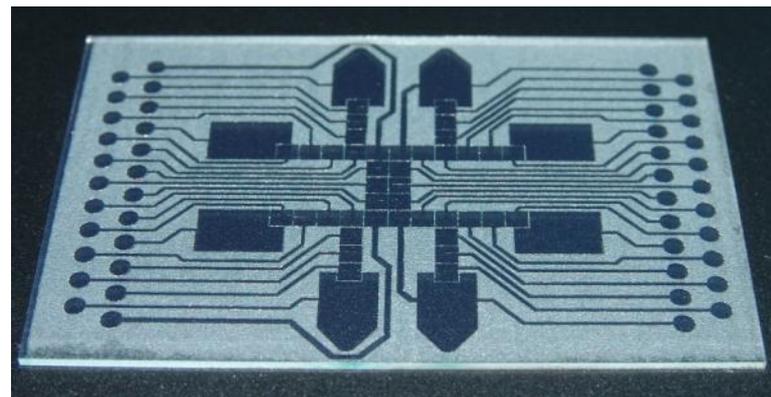
- Automate laboratory sample preparation at the microfluidic scale
- Flexible fluidic hub to seamlessly connect capabilities together
- Programmable processing and workflow



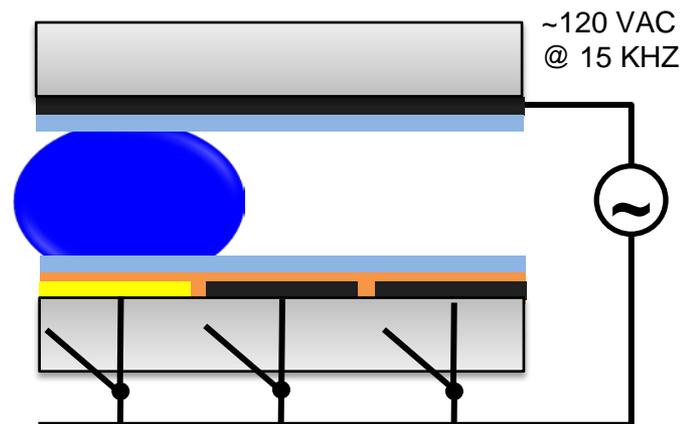
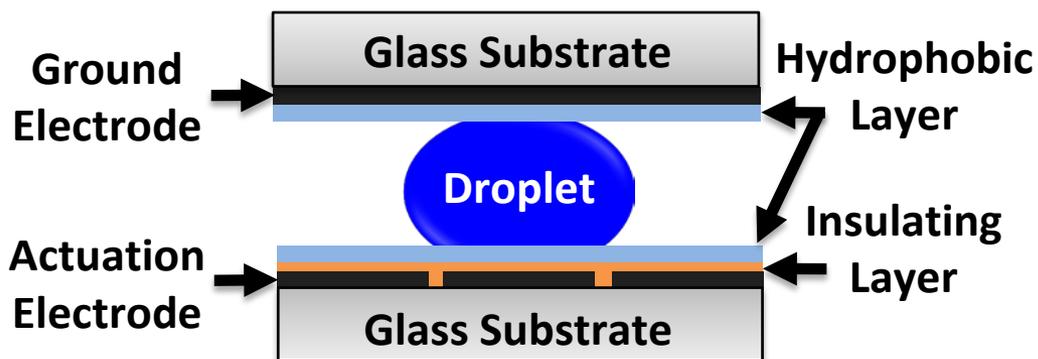
Underlying Technology

Based on principles of electrowetting-on-dielectric (EWOD) and dielectrophoresis

- voltage is applied to electrode pads in an addressable 2-D array (glass, PCB, etched films)
- All aqueous droplets can be manipulated (buffers, ETOH, DMF, bleach... beads, cells, polymers...)
- Teflon-coated surface minimizes surface fouling and contamination



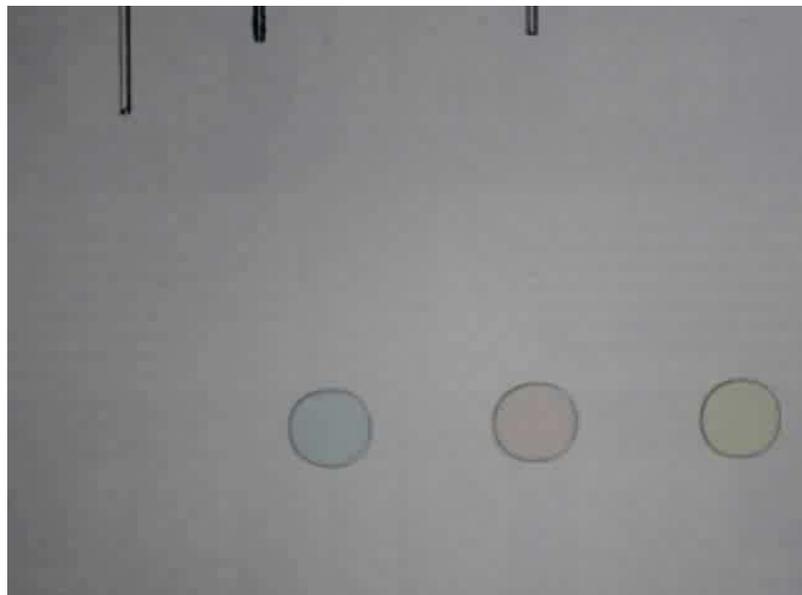
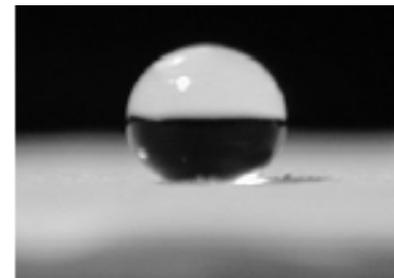
46-pad laser-etched design



Underlying Technology

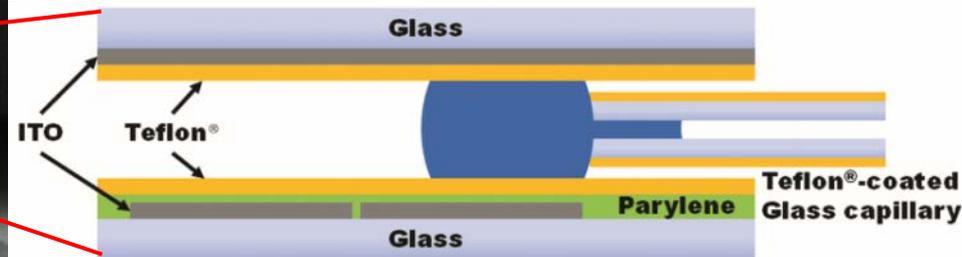
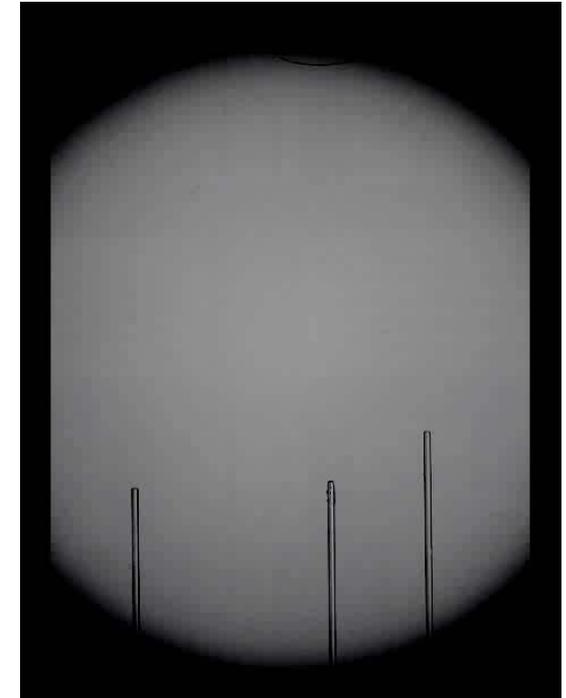
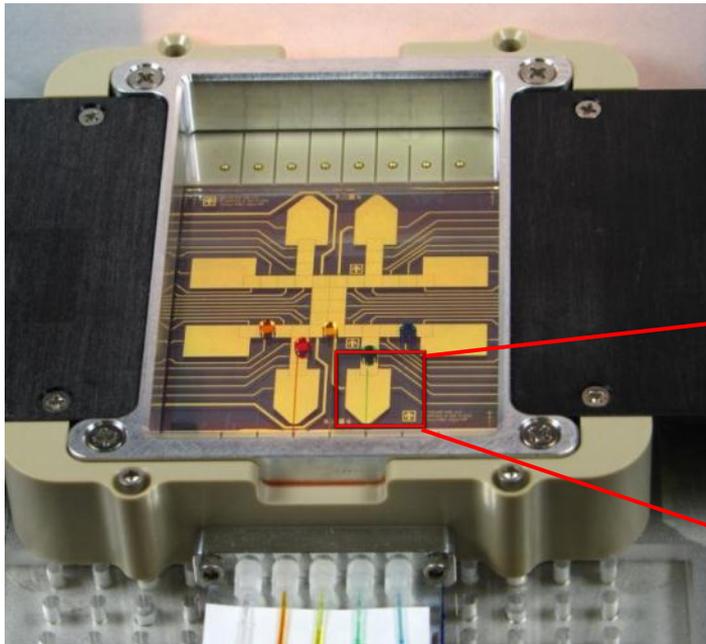
Core architecture is the Sandia Digital Microfluidic Hub

- Use microliter droplets as sample cargo containers
 - Operated “digital” fashion
 - virtual tubes or microreactors
 - Merge, mix, split (virtual pipetting)



Key Advantages

- Standardized fluidic interface for transporting fluids and reagents
- Overcomes limitations due to volume scales
- Programmable processing and workflow

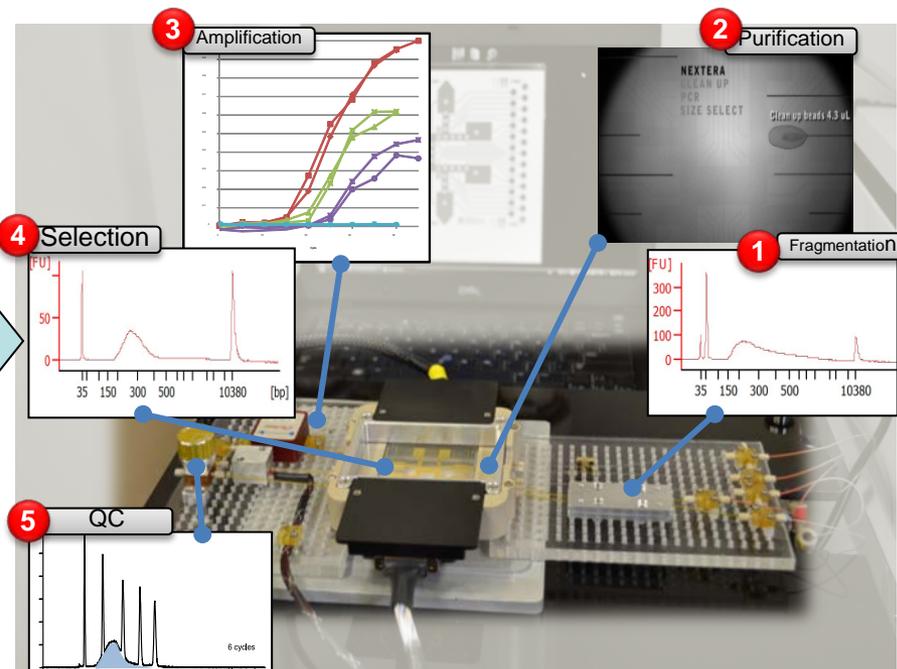
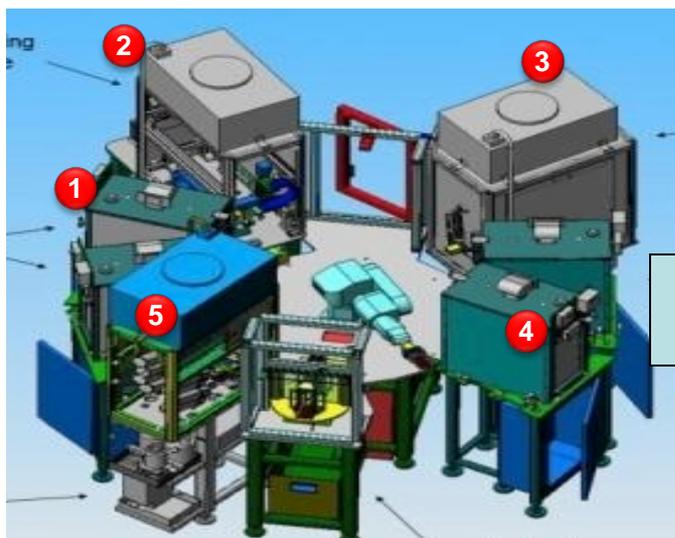


Cross-section view

Sandia Digital Microfluidic Hub

Differentiating factor from existing technology

Translate robotic liquid handler workflow to the microscale



Commercial Applications

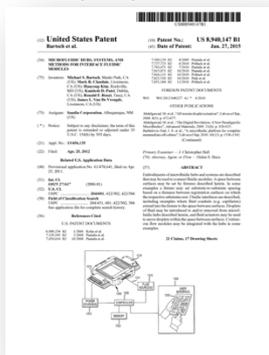
- **Diagnostic sample preparation**
- **DNA forensics**
- **Small-scale laboratory automation**
- **Analytical instrument QC integration**

Commercial Applications

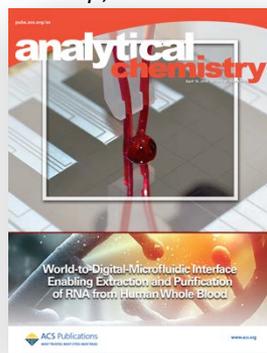
- Diagnostic sample preparation
- DNA forensics
- Small-scale laboratory automation
- Analytical instrument QC integration



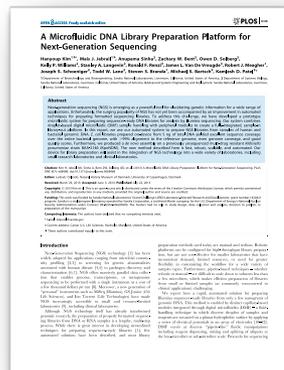
M. Bartsch et al.
US8,940,147 2015



M. Jebrail, et al, A Chem
Lab Chip, 2014



H. Kim, et al, *PLOS ONE* 2013



M. Jebrail, et al, *Lab
Chip*, 2012



Bartsch et al,
R&D 100, 2012

