

Testing an Inkjet Printer for Use in MEMS Fabrication

Marvin Cruz

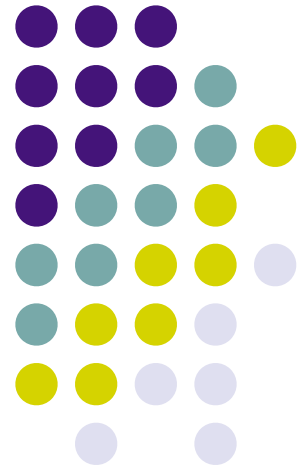
Home Institution: University of California, Santa Cruz

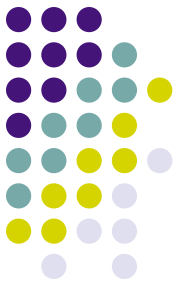
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Center for Adaptive Optics

University of California, Santa Cruz





Outline

1. Introduction to MEMS
2. Project Description
3. Process and General Workflow
4. Data Analysis and Results

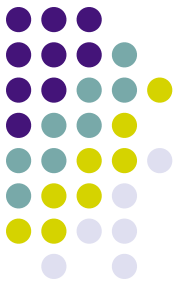


Introduction to MEMS

- MEMS are micro-electro-mechanical-systems
- Various applications include sensors, actuators, and (RF) switches
- Fabricated through surface micromachining processes
 - deposit layers of material on a substrate
 - perform photolithography and etching to remove unwanted material

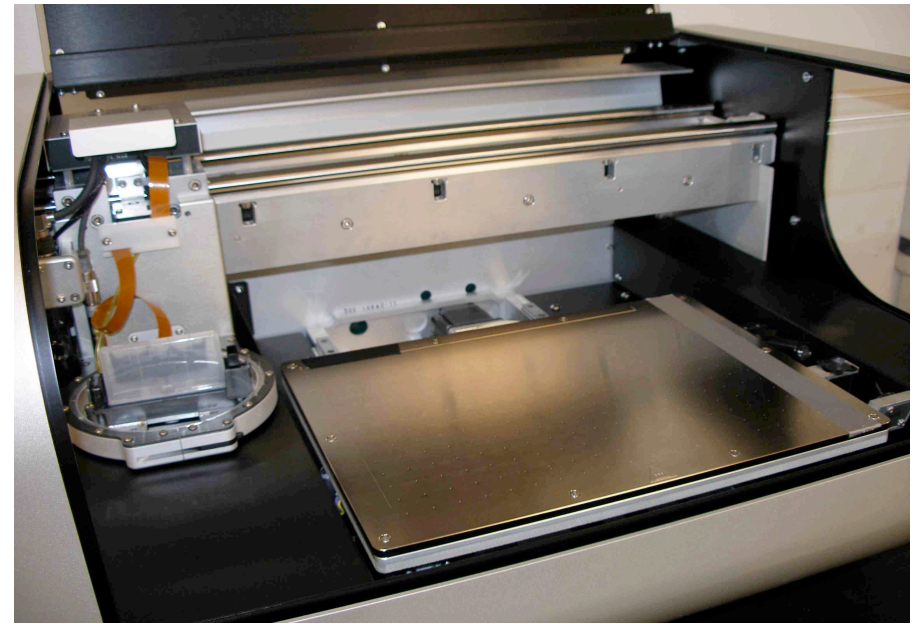
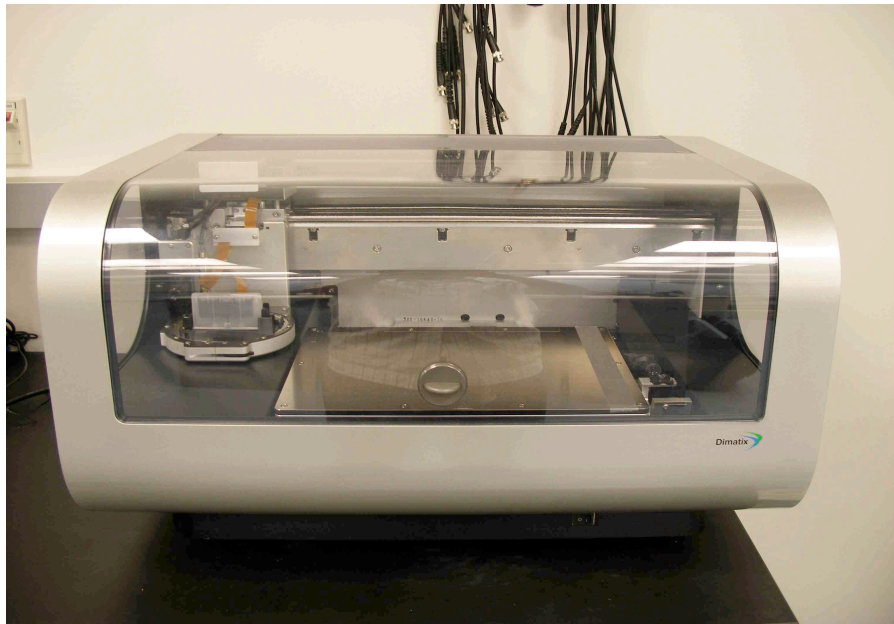


*image courtesy of http://www.stanford.edugroupquate_groupMemsFrame.html



Project Description

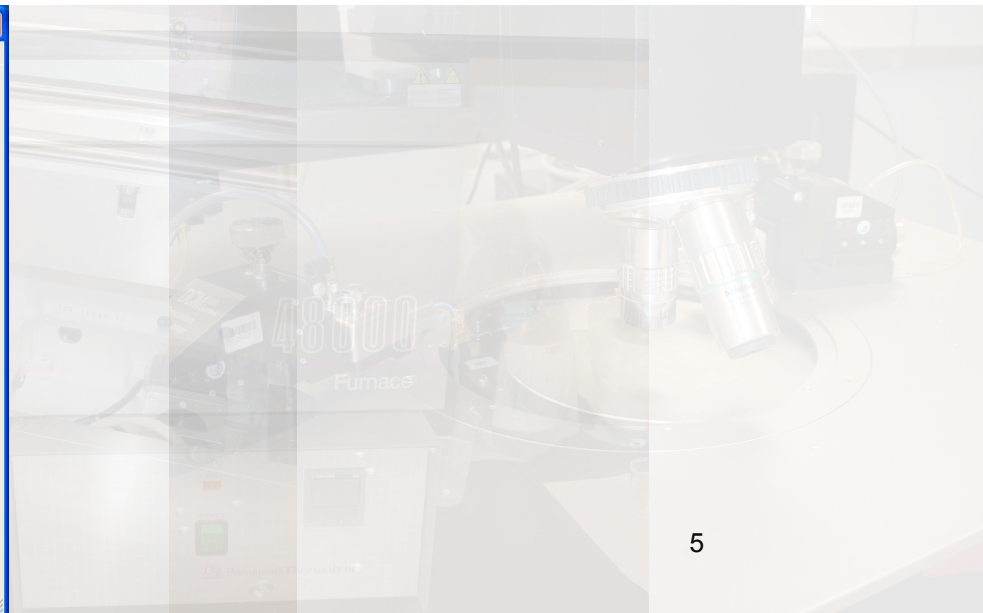
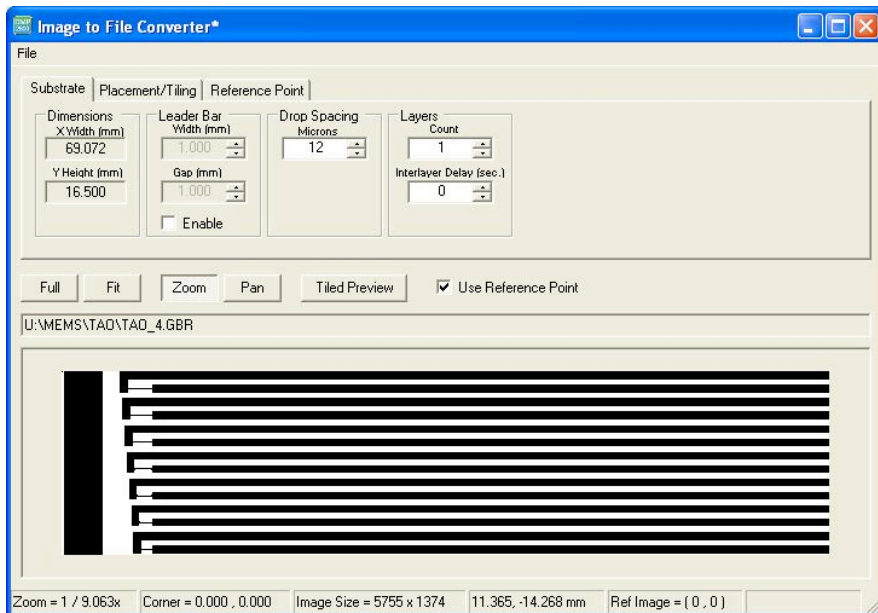
- Use special inkjet printer to deposit thin films of material (layer by layer) on a substrate





Process and General Workflow

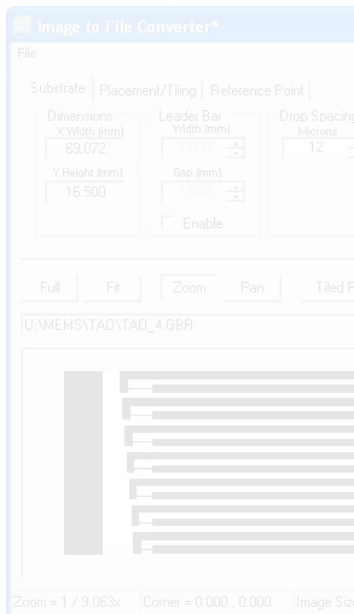
1. Design MEMS device and chose substrate and ink
2. Calibrate printer and print device
3. Investigate ideal sintering time and temperature and sinter device in convection oven
4. Characterize device using various lab tools

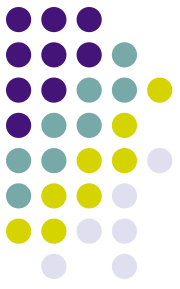




Process and General Workflow

1. Design MEMS device and chose substrate and ink
2. **Calibrate printer and print device**
3. Investigate ideal sintering time and temperature and sinter device in convection oven
4. Characterize device using various lab tools

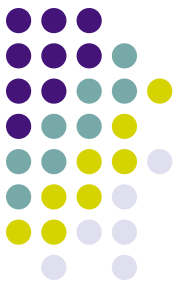




Process and General Workflow

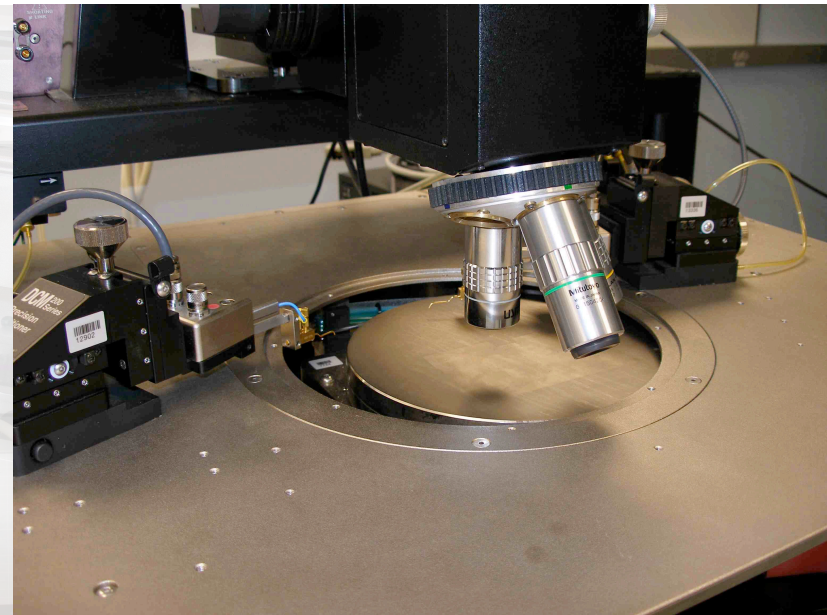
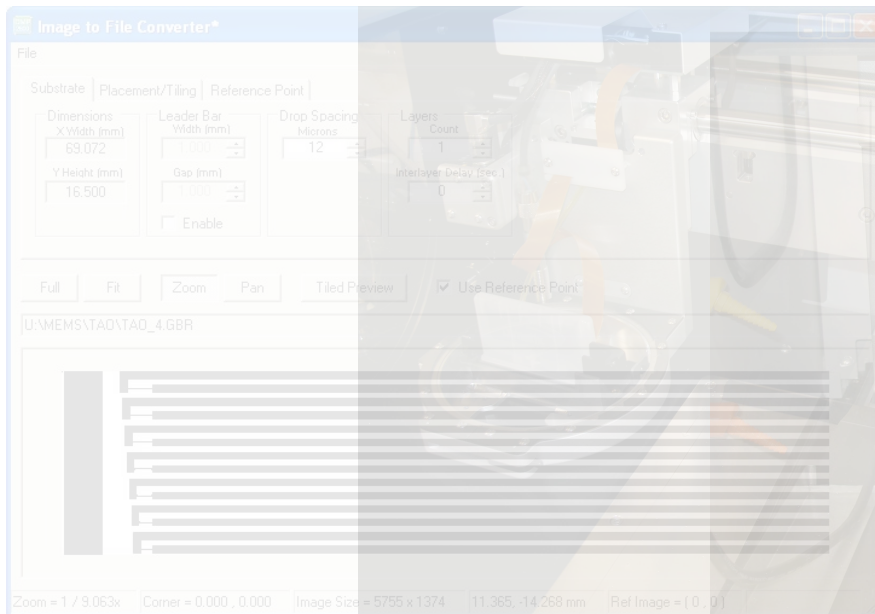
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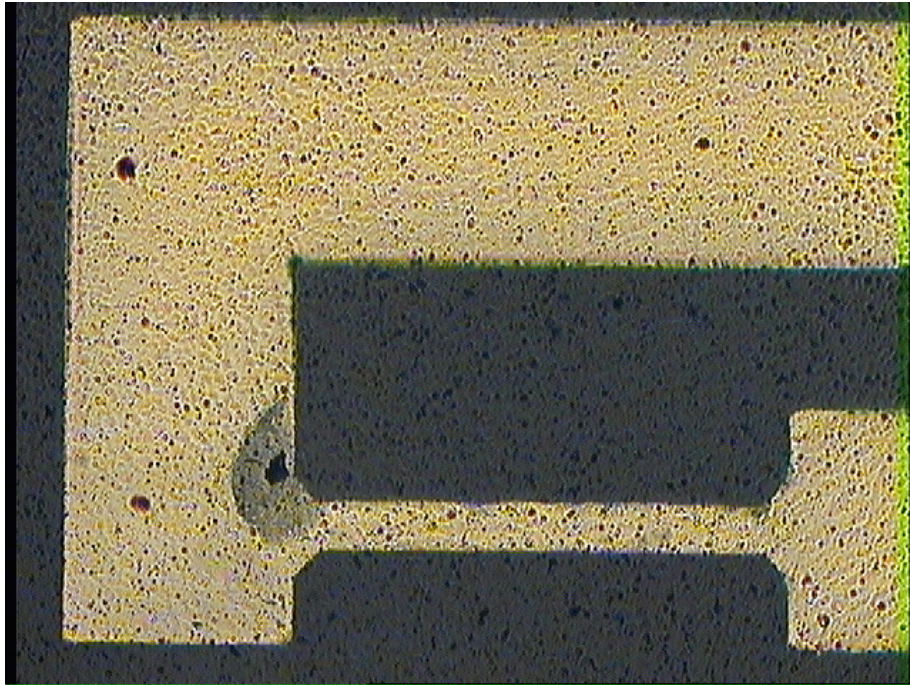
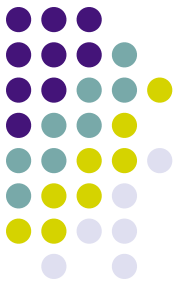


Process and General Workflow

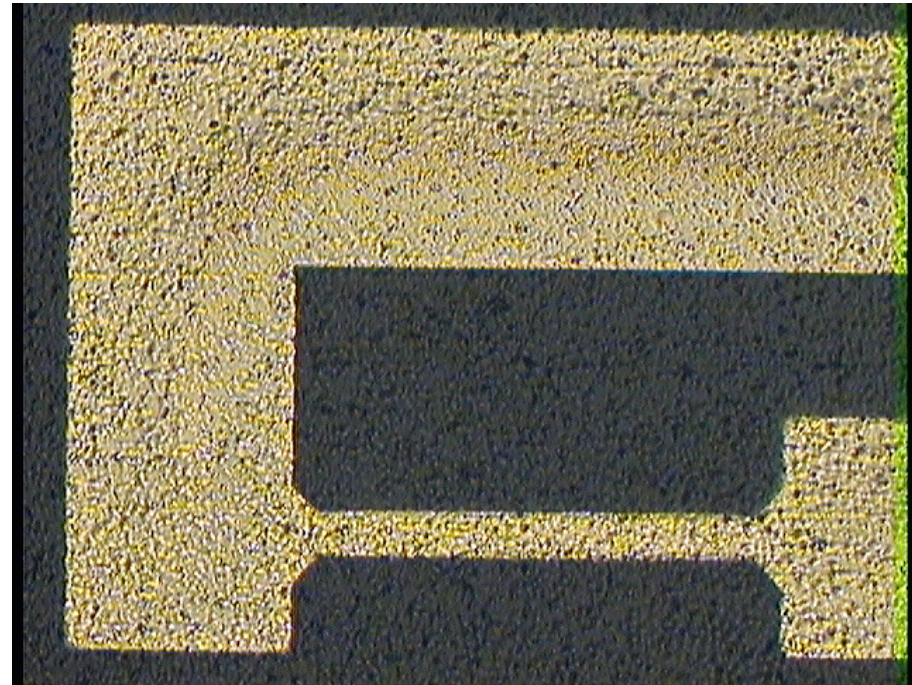
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Substrate Cleaning

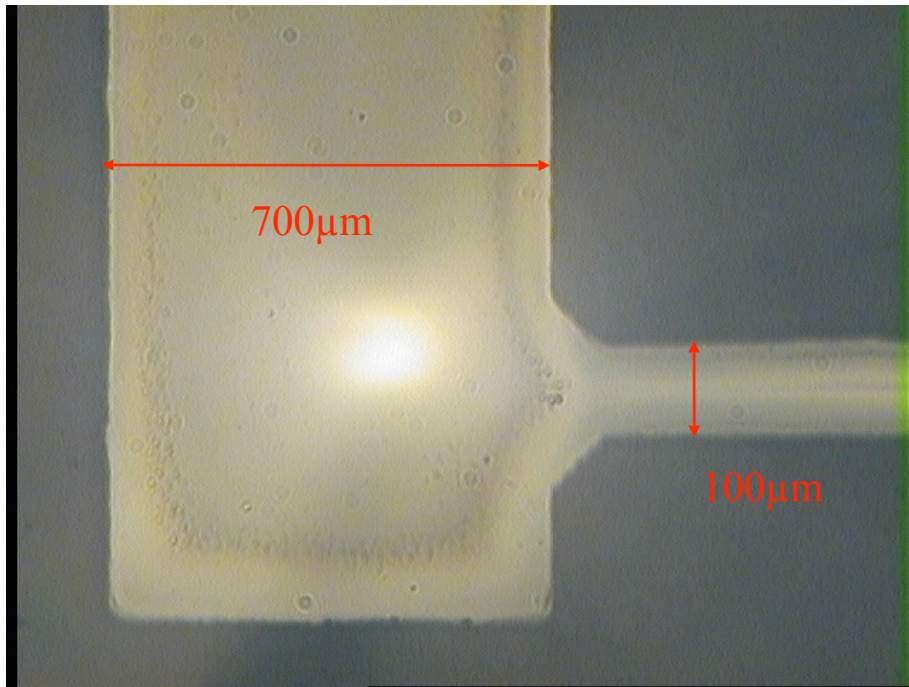
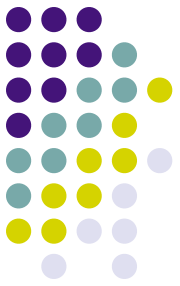


Anemometer design
no cleaning

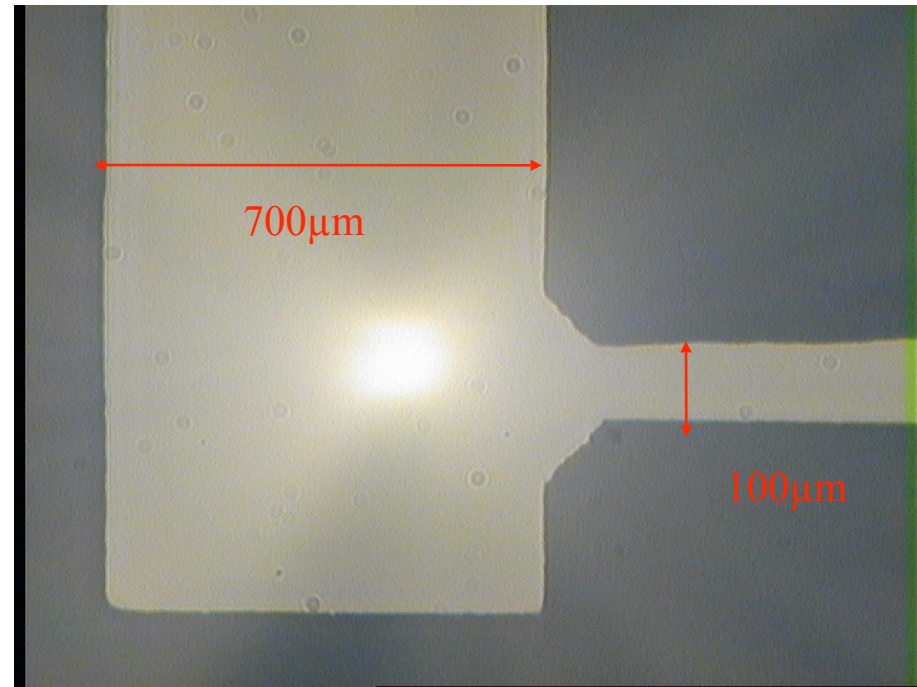


Anemometer design
cleaned with alcohol and pre-baked

Resolution Improvements with Cartridge Size

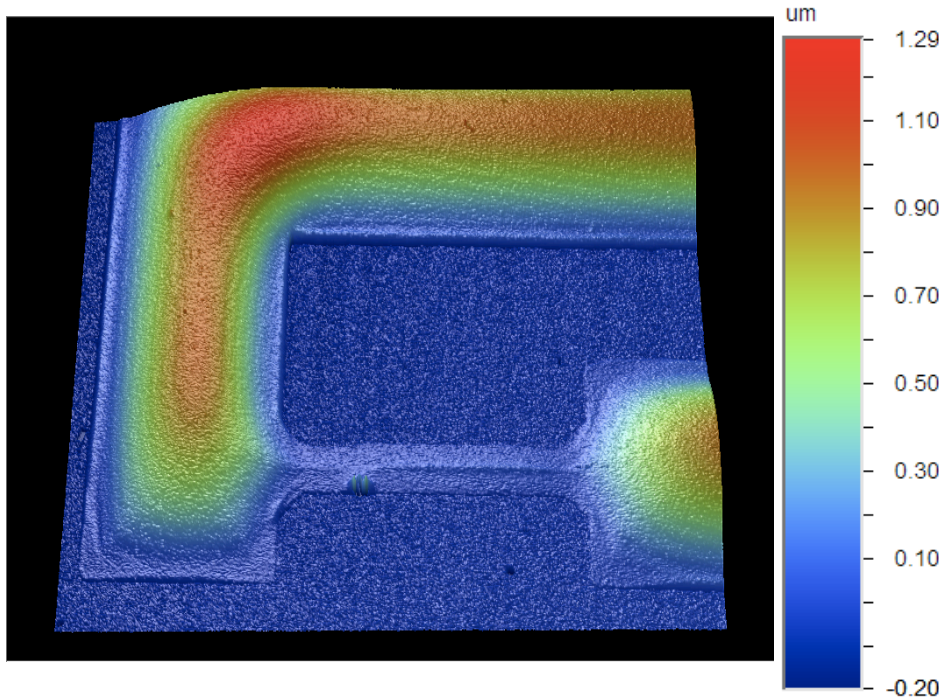
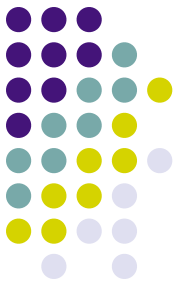


Anemometer design
10pL cartridge

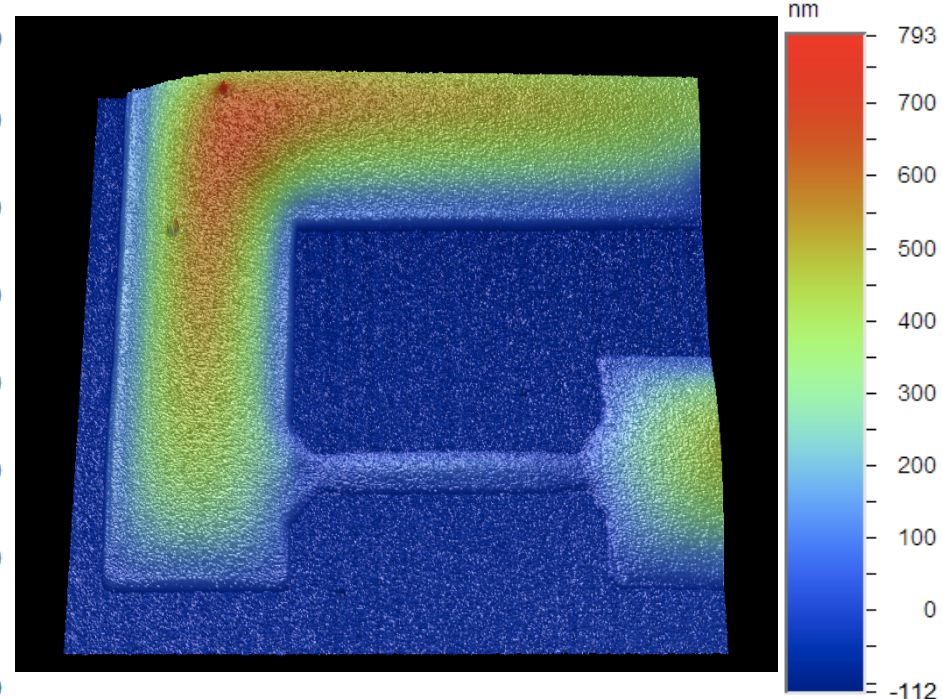


Anemometer design
1pL cartridge

Resolution Improvements with Cartridge Size cont.

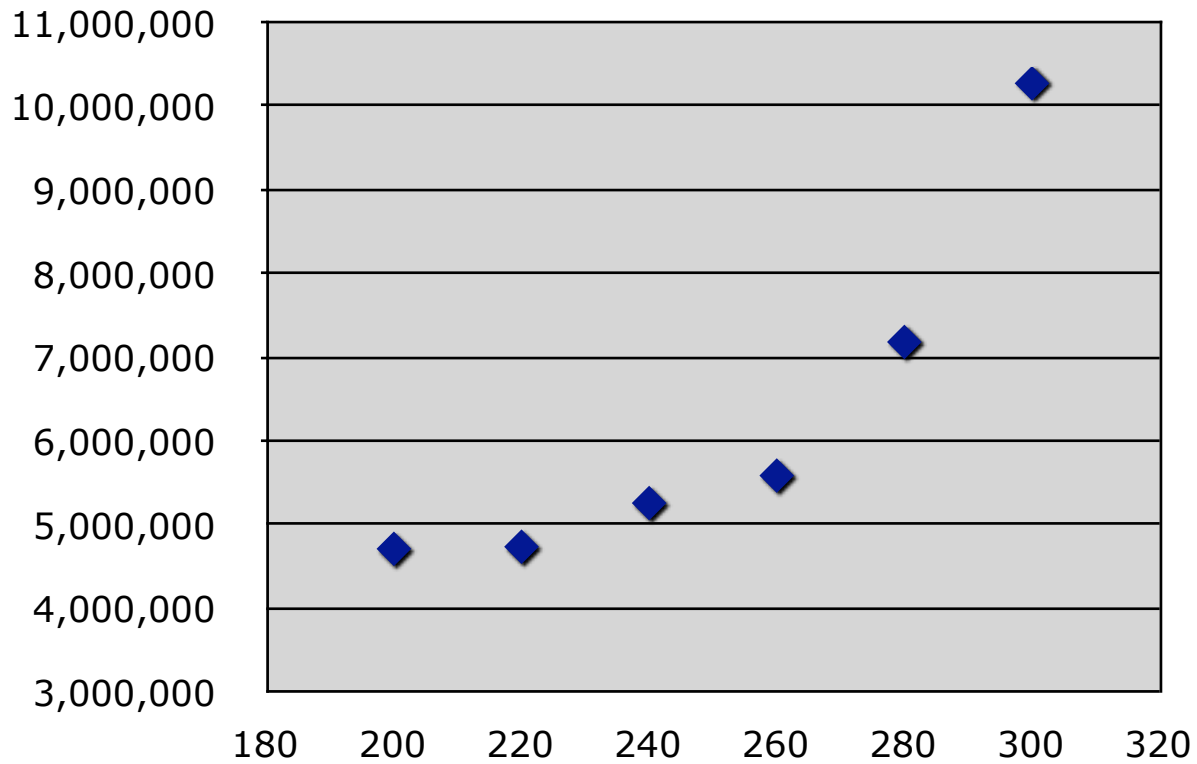


Anemometer design
10pL cartridge



Anemometer design
1pL cartridge

Conductivity and Sintering Temperature

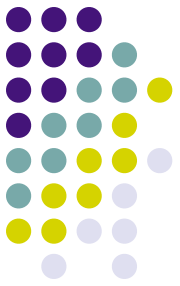


Future Work



- Continue testing other substrates and observe relevant topography characteristics and measure conductivity
- Extend printing to include more complex, multi-layered devices

Acknowledgements



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