Testing an Inkjet Printer for Use in MEMS Fabrication

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Outline

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

- MEMS are micro-electromechanical-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.edu/groupquate_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 choose 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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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

- Joel Kubby
- Oscar Azucena
- Bautista Fernández
- Darwin Fernandez
- Lynne Raschke
- Hilary O’Bryan
- Lisa Hunter
- faculty, friends, and fellow interns from the CfAO

This project is supported by the National Science Foundation Science and Technology Center for Adaptive Optics, managed by the University of California at Santa Cruz under cooperative agreement No. AST - 9876783