Oscillator Array Based Sensing
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**Project Description**

- This work sought to develop an array of mass sensors functionalized with reactive chemistries for the detection of trace volatile organic compounds.
- This approach addressed concerns regarding the sampling time of uncoupled, resonant mass sensors and provided low-cost, high-throughput sensing arrays.

**Approach**

- Sensing elements, 16 MHz quartz crystal oscillators, were functionalized with inkjet printing.
- A frequency counting algorithm was implemented to track the oscillation frequency of the sensors.
- The shifts in frequency due to mass adsorption were mapped to analyte exposure to create sensitivity models.

**Discussion**

- Preliminary results showed promise in developing sensing arrays responsive to methanol and toluene.
- Future work to implement redundancies in the array and characterize the response to confounding species is ongoing.

**Results**

- Representative frequency data of an oscillator functionalized with poly(4-vinylpyridine) and exposed to methanol is shown.
- As expected, the device exhibited a reversible shift in oscillation frequency when exposed to methanol.

Oscillators were implemented as sensing elements and their oscillation frequency was tracked in a low-cost manner through frequency counting algorithms.