

# SACE Microfactory

MECH TEAM # 11

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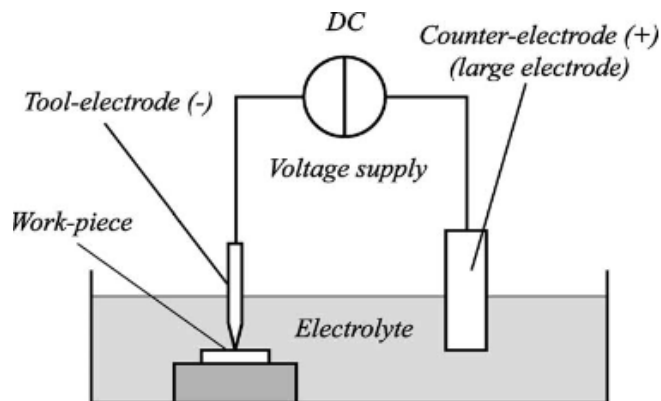
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## What is SACE?

Spark assisted chemical engraving allows for 3 dimensional engraving in non-conductive structures. A critical voltage applied between the anode and cathode causes a high temperature coalesced vapour film to form, etching the test wafer.



General SACE diagram [1]

## Objectives

Improve existing SACE microfactory safety and machining quality by:

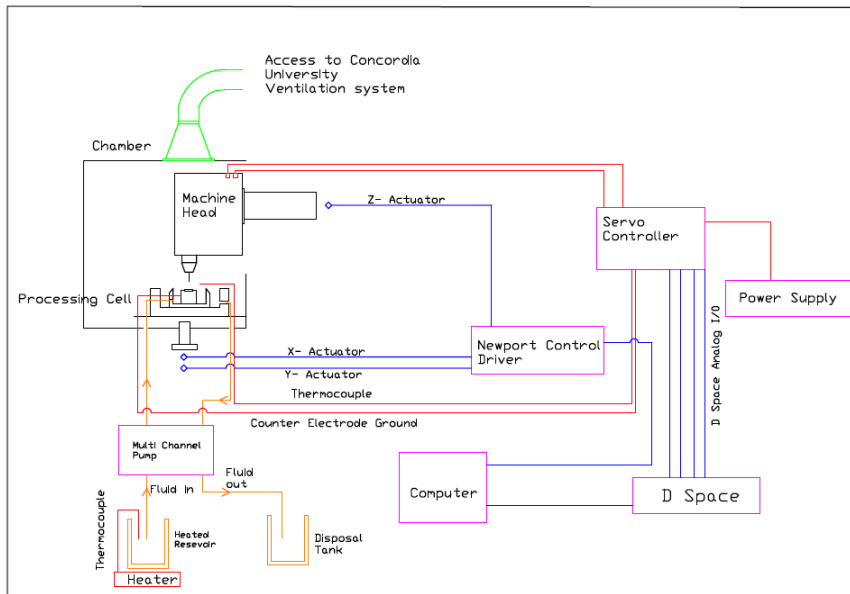
- Protecting surrounding environment from corrosive sodium hydroxide vapour and splatter
- Controlling electrolyte level above glass wafer
- Maintaining local electrolyte temperature
- Adding rotational component to etching tool

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The upgraded SACE allows for:

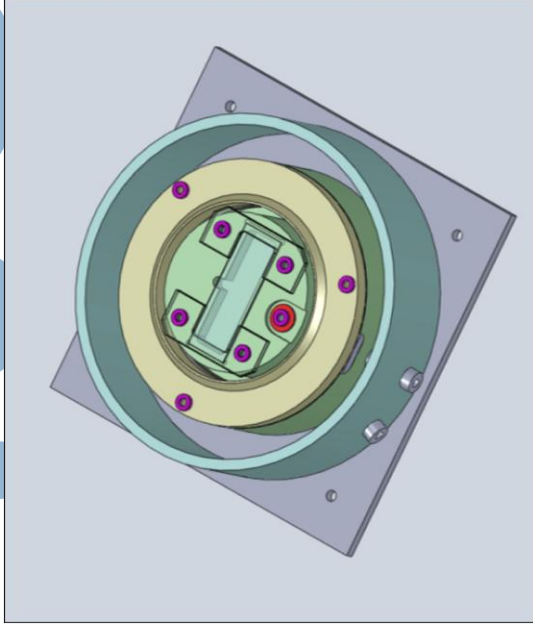
- Protection of surrounding equipment and personnel
- Relative x, y, z-motion, and tool rotation
- Known variable electrolyte height above glass wafer
- Monitored electrolyte temperature
- Controllable electrolyte flow rate via manual peristaltic pump
- Ease of maintenance and disassembly
- Reduced maintenance and replacement cost



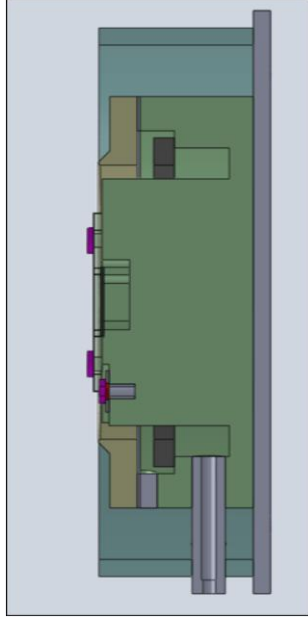
Schematic of SACE System

# SACE Microfactory Processing Cell

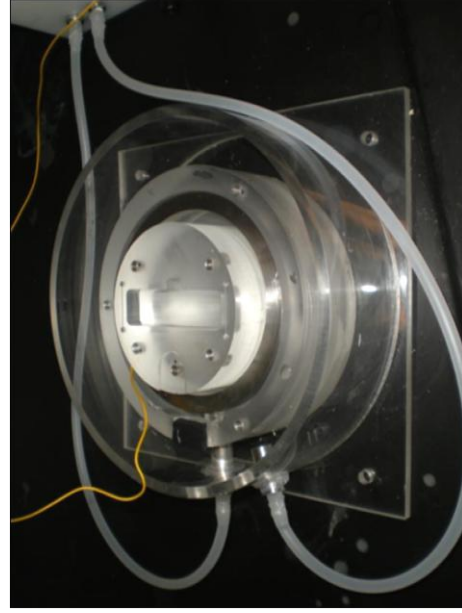
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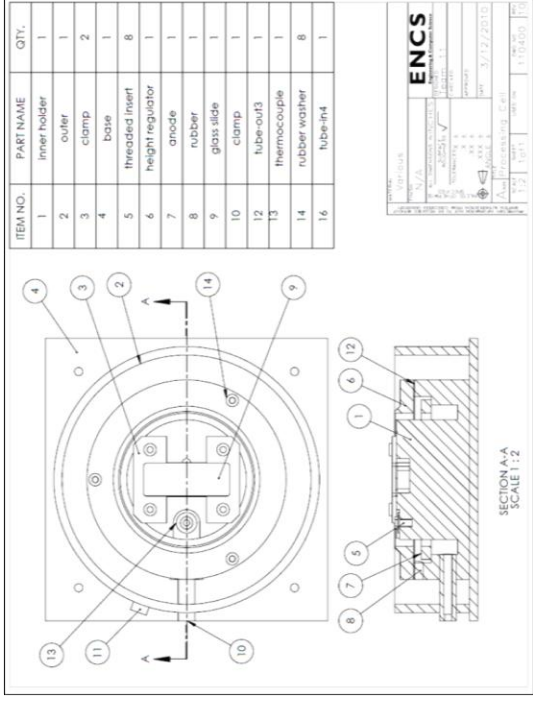
Isometric View of Processing Cell



Cross Sectional View of Processing Cell



Assembled Processing Cell



Components of Processing Cell

## Features of Processing Cell

- composed of corrosion resistant cast acrylic and 300 series stainless steel
- contains secured glass test section
- slot for easy test section removal
- allows for electrolyte intake and evacuation via manually controlled dual head peristaltic pump
- removable barbed fittings and height regulator for ease of maintenance
- allows for temperature reading in the vicinity of glass wafer, as fluid temperature affects machining quality
- adjustable fluid levels above test section, as optimal fluid level is currently being researched
- prevents accidental cathode (tool) and anode contact
- stainless steel threaded inserts used to maintain integrity of threads
- mounted on x and y actuators to allow for relative motion with etching tool