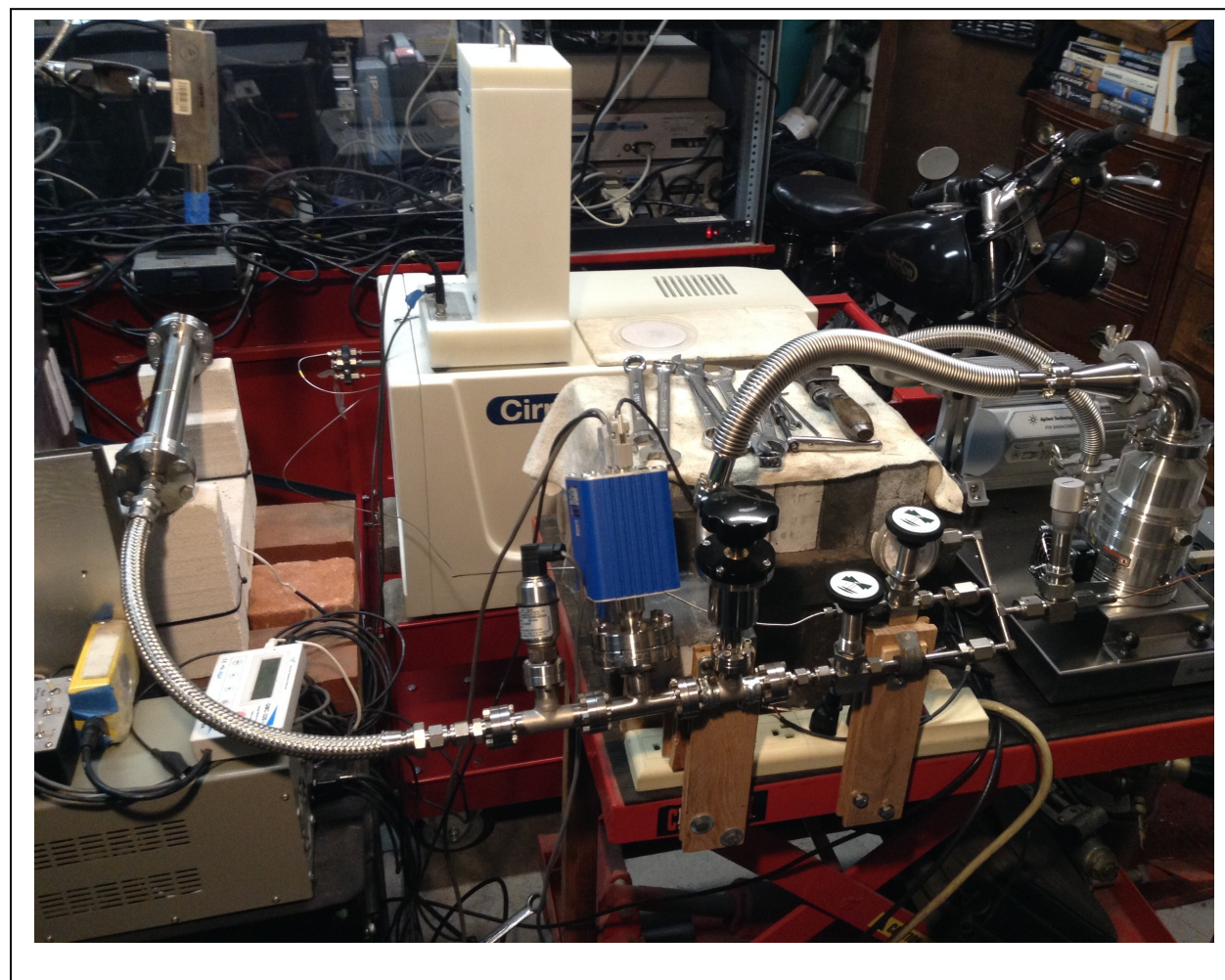


Magicsound Lab - Mizuno replication

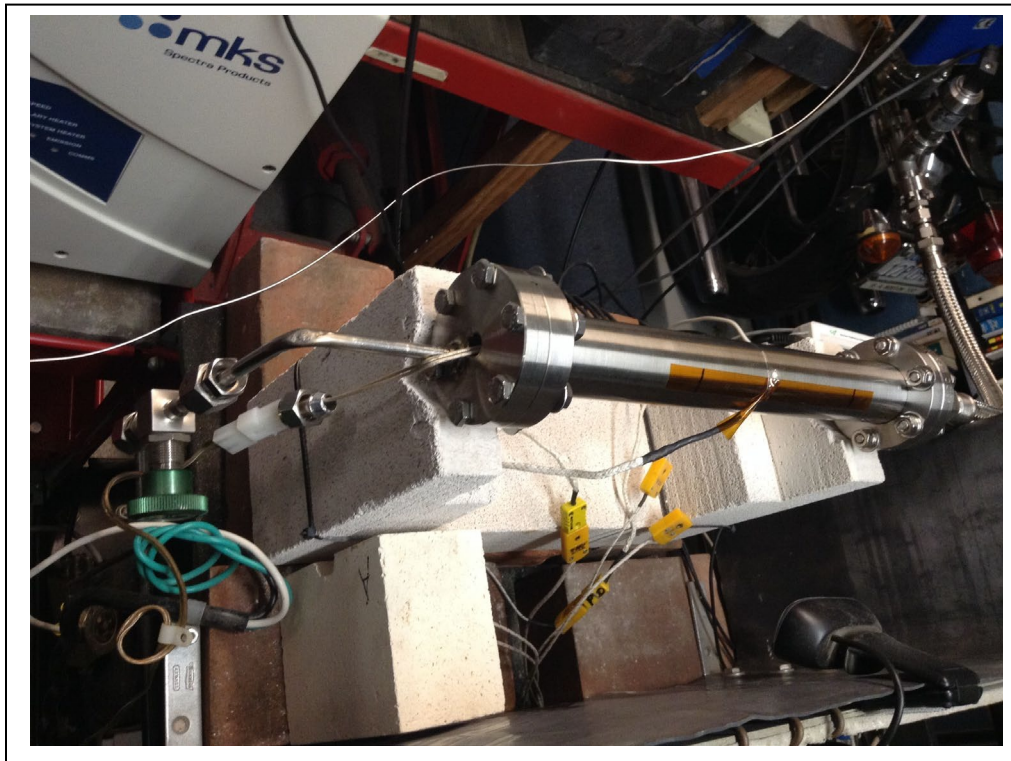
Work in process: Last revision 12 January 2020

The past month was devoted to upgrading the vacuum system. Thanks to a generous donor, a new Agilent Flexy turbo pump system was sourced and installed. The vacuum plumbing was also upgraded, starting with new bellows-stem valves throughout. A hydrogen-compatible pressure sensor was also mounted, calibrated and integrated with the DAQ system. All the vacuum plumbing past the main valve now uses SS-304 Conflat or Swagelok/VCR fittings.

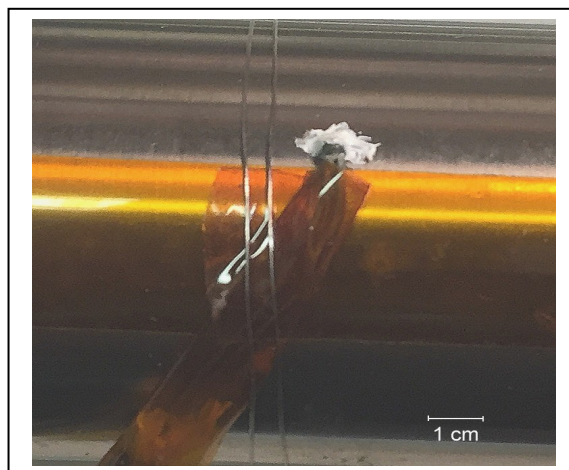


The new cell is 1.5" OD SS304 tubing with Conflat 2.75 end caps. It was made by LDS Vacuum Systems, \$180 fully polished, cleaned and tested at 1E-5 Torr. A locally fabricated 3/8"(ID) x 10" x .062 SS304 thermo-well is TIG welded into one end cap. A small VCR tube and valve for mass spec. gas sampling was also added. The DC-powered 300 watt 5/16 x 5" cartridge heater is inserted into the thermo-well tube.





A type K thermocouple is mounted near the center of the cell, with two wraps of 30 gauge Nickel wire to secure it and some Kapton tape for electric insulation. A small dab of white heat sink compound is applied under the junction to improve the thermal coupling with the cell tube.



The new hardware is vastly improved in capability. In initial bake-out, the system pumped down to $2.1\text{E-}6$ Torr (0.0003 Pa) and maintained that level during several hours at up to 150°C (50 watts). After cooling, a base vacuum of $9.8\text{E-}7$ Torr was seen. After 24 hours soak with the pump off, the pressure rose to $3.2\text{E-}3$ Torr, about 0.5 Pa per day. This is good enough to move on with calibrations. I'll be adding a Baratron (capacitance) gauge for accurately measuring hydrogen pressure, as soon as a few mounting parts arrive.