

Critical point drying of suspended structures after wet etch

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In this report I monitor a full successful cycle of critical point drying (CPD) run for drying MEMS sensors after wet release using KOH etching. The pressure and temperature of the CPD tool (Tousimis) is monitored during the process and plotted in a P-T diagram with CO₂ critical point. A few notes for higher yield in the drying process are mentioned in this report as well.

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After KOH etching, samples are moved to a beaker containing HCl with 37% concentration to remove the Fe₂O₃ contamination of the KOH etch for 2 hrs. Samples are rinsed and making sure the PH is back to 7. Samples are transferred to a beaker containing 99.9% pure ethanol to avoid introduction of water to CPD chamber. Pure ethanol is poured in the CPD chamber.

NOTE: CPD chiller is turned on 30min before using the tool to reduce coolant temperature and warm up the chiller chamber of the tool.

Samples are moved to CPD and the top lid is tightened in a star pattern. (It is also ok to do every 4th and rotate several times).

NOTE: the ethanol in the chamber should be about 5mm below the purge/fill holes of the chamber so that when the liquid CO₂ is coming in it does not enter in the present ethanol. This should lead to having the holder in and the liquid level being below the two fill holes.

Press cool and wait for the chamber to cool down to 12 degrees C. Starting the CPD fill run. The overall cycle is monitored and showed here. The time between each P-T measurement is about 4 min:

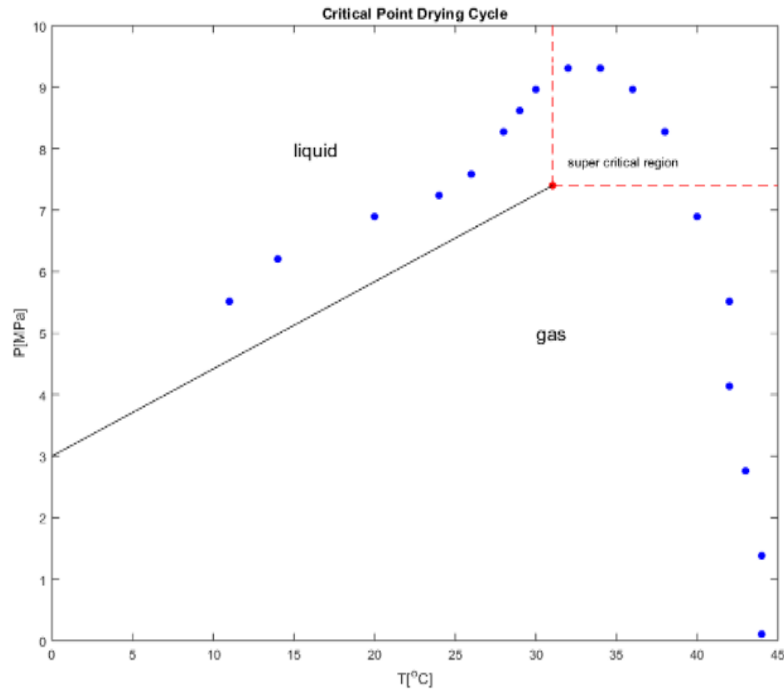


Figure 1- Critical point drying cycle for Tousimis tool at CMi EPFL.

Monitoring the P-T curve of a successful cycle of critical point dryer tool at EPFL cleanrooms.