

For Preventing pattern collapse

Compact Supercritical Dryer

A pattern collapses when liquid surrounding the pattern in various fabrication processes dries up. Supercritical drying can prevent the pattern collapse.

FEATURE

◎ Novel supercritical process

- >> The new solvent; non-flammable and low-toxic fluorocarbon liquid (HFE), which is different from conventional high-pressure CO₂ gas, is used as a supercritical material.
- >> Critical pressure of HFE is about one-third of that of CO₂. It enables the downsizing of system.
- >> High zeta potential of HFE avoids particle adhesion.

◎ Simple operation

- >> Process is started by only pushing a start button after filling the chamber with HFE.
- >> No additional high-pressure gas cylinder is necessary.

◎ Space saving

- >> The footprint is less than 1m², e.g., for laboratory use.

◎ Easy Customization

- >> Simple device configuration enables customers to design the chamber with a various size.

◎ Safety devices

- >> High safety is maintained by a door lock system, an overheat protector, safety valves for overpressure, etc.

PCO-4SC

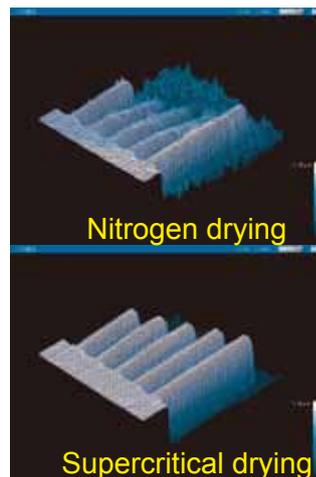
For laboratory use



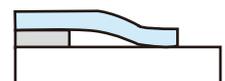
Specifications

typical process pressure : 2.6 MPa
 typical process temperature : 473 K
 chamber capacity : around 60 cc
 overall size : W 500 x D 400 x H 470 mm

The effect of supercritical HFE drying



Si layer
SiO₂ layer
Si substrate



sticking

Si layer
SiO₂ layer
Si substrate

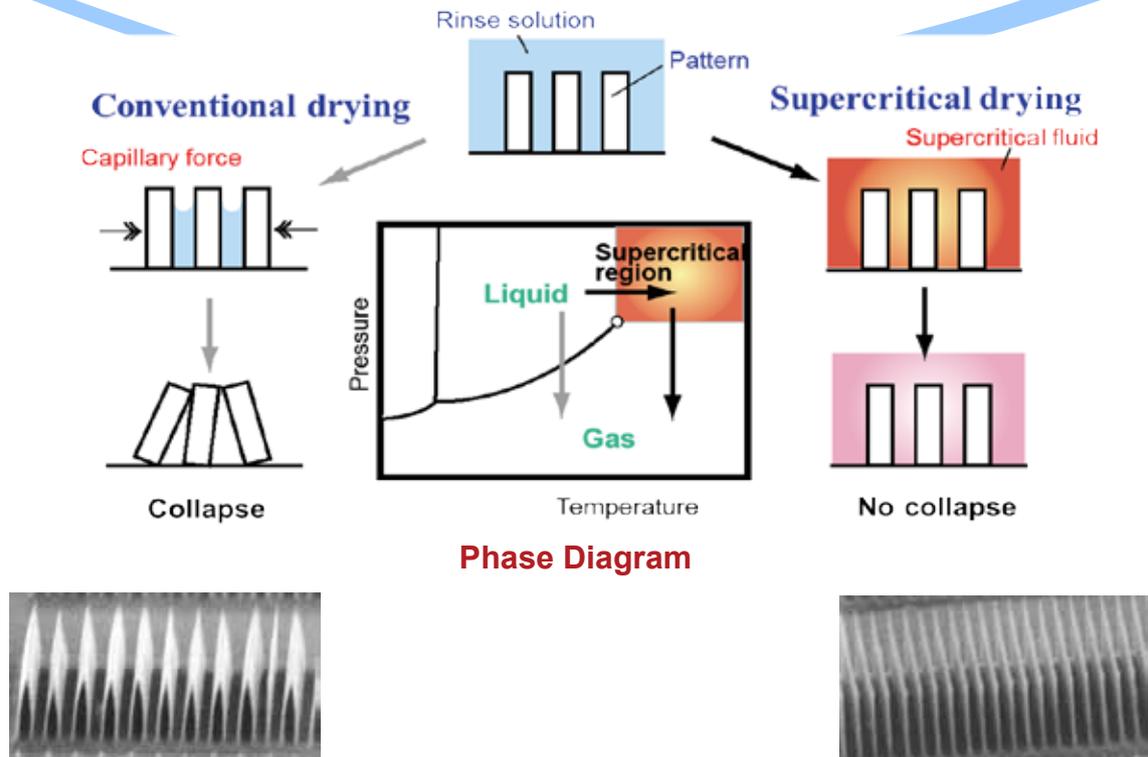


no sticking

Cantilever Structure

Why does a fine structure collapse ?

Why is supercritical drying required ?



When drying is carried out with a conventional nitrogen blow, the alcohol or water used for rinsing is converted to gas. That is, the phase passes through the vapor-liquid curve. During this process, there is a liquid/gas interface, so surface tension is generated. The capillary force caused by the surface tension of the rinse solution remaining between lines makes them collapse.

On the other hand, when the rinse solution is completely replaced with a liquid and the liquid becomes supercritical, there is no liquid/gas interface. This is because liquid and gas are indistinguishable in this region. So, the surface tension is zero; and consequently, no capillary force is generated. The release of fluid to the atmosphere at a constant temperature dries the sample without the phase crossing the vapor-liquid curve. This should prevent pattern collapse.