How to prepare SIMS samples?

**Precaution:** Liquid, volatile samples or any substance, which contaminate the chamber of instrument under the vacuum condition, cannot be put into any of the instruments.

- **Dimension of SIMS sample**
  Typically, the diameter (diagonal) of the sample should be <22.0mm, and its thickness should be <3.5mm. If your sample is bigger than above size or irregular in shape, please contact us to handle your sample.

- **Cleaning samples**
  When you prepare SIMS or XPS samples, the samples and the sample holders should be handled with clean tweezers and gloves. Please use polyethylene gloves rather than latex gloves. Some latex gloves contain silicones. Silicone is one of the most common contaminants of surface, and it is easily introduced by various materials such as oils, greases, heater transfer fluid, sealants, adhesives, surfactant, and medical devices. The typical silicone is polydimethylsiloxane (PDMS), which has a very low surface tension and thus preferentially segregates on the surface of sample. The silicone contaminant on the surface will play a role of “mask” or “cover” so that ToF-SIMS will detect the strong signal from silicone rather than the real sample. Silicone results in the characteristic peaks including 28, 43, 73, 147, 207 and 221, which are illustrated in the following spectra.

![SIMS spectrum obtained from the silicone-contaminated sample](image)

You can ultrasonically clean samples in the following solution if the solution does not do damage to your sample:
- Step 1: methylene chloride
- Step 2: hexane
- Step 3: acetone
- Step 4: methanol

**All the chemical solution should be highly pure.**

[REFERENCE: TRIFT II operator’s guide, Physical Electronics]

3. **Preparing powder samples**

Powder samples must be treated carefully, otherwise loose powder in the vacuum chamber will contaminate the vacuum system. Generally, there are four options to prepare powder samples. All the options can be used to prepare not only the SIMS sample but also the XPS one.

1. **Embedding powder into the adhesive tape.**
It is very easy to make a sample this way. However, the spectrum will present some peaks induced by the carbon tape.

(2) Making an indium/powder/indium sandwich.

The 0.1-0.5mm thick indium foil can be obtained from Fisher Scientific. Before use the indium foil for sample preparation, please clean the indium foil as described in the previous section.

(3) Making a pellet.

Put the loose powder into a die. Press the power to form a pellet. Please avoid the possible secondary contaminant from the partsof the die.

(4) Pipetting suspension.

If your sample is fine powder such as nano-sized particles, you can disperse the particles into an inert solution. Then you just pipette a drop of solution on a substrate, subsequently let the solution dry. The method is good for examination of individual particles. But it cannot be used for large particles (>100micron), because it is hard for large particles to stick on the substrate.