

INSTRUCTIONS FOR USE



SPI Supplies
206 Garfield Avenue,
West Chester, PA 19380, USA

SPI Replicating Tapes and Sheets

All SPI Replicating Tapes and Sheets products are made from the same high purity, highly homogeneous cellulose acetate, specially selected for high performance applications in science and technology. Our greatest concern about generic cellulose acetate is the presence of gel particles but we have never found, in the special SPI Replicating Tapes and Sheets any evidence for even the small gel particle.

Over the years, there have been a number of different protocols and procedures for the use of these product, and for illustrative purposes, we will present the two extremes:

Application from dilute solution:

We would recommend making a "stock" solution of 3% in acetone. Simply weigh out a quantity of the tape or sheet, and dissolve in acetone to make a 3% solution.

With an ordinary eye dropper or pipette tube, extract some of the liquid and deposit the solution on the surface to be replicated. Obviously, that surface can not be soluble in acetone, so this would rule out most polymers and other plastic systems. This system was designed primarily for use on metals, ceramics, refractories, and other surfaces that would not be changed or swollen by the application of acetone.

Most surfaces are not readily "wet" by acetone, therefore the liquid will tend to "bead up" on the surface. After a few hours, the acetone will have evaporated, leaving a thin cellulose acetate film behind on the surface.

Once the film is completely dry, and we like to recommend a short exposure to the hot air from a hair dryer, it is quite brittle, but not too brittle to be stripped off of the surface, taking with it a perfect "impression" or negative replica of that particular surface.

Now, this stripped off replica at this point can be examined several different ways:

- a) It can be platinum/carbon shadowed, using established platinum carbon shadowing techniques, the cellulose acetate dissolved away, with the "replica" being picked up on TEM grids and photographed by TEM, or
- b) It can be gold coated, after mounting onto an SEM mount, and examined by SEM.

Clearly the two views will be somewhat different, with the TEM giving the highest resolution, of course, but when viewed by both methods, one does have the potential for gaining a far better understanding of the surface morphology.

Application from swollen solid

Some surfaces are of a nature that one must minimize either

- a) Exposure to acetone or
- b) Degree of penetration into a porous structure.

For example, if the surface to be replicated is a plastic material itself, sometimes a better result is obtained by squirting some acetone onto the sheet or tape, thereby "softening" it and then after this has been done, the softened surface is literally pressed onto the surface. This approach generally requires a longer time for solvent evaporation and the use of the hot air dryer might even be more important because of that added thickness. But one can get to the point where they have a dry and brittle film on the surface of interest, and it can be stripped off exactly as indicated previously.

And then the protocol can be continued as indicated above.

There is another possible variation on the technique and that is, for TEM examination only, the surface to be studied is *first* Pt/C shadowed, and *then* the cellulose acetate is applied using either of the methods described above. Absent any reason otherwise, we would recommend the dilute solution approach in this instance in order to get the best stripping off of the replica.

Now some polymers like PTFE and probably other materials as well, exhibit peculiar surface properties that cause an anomalous agglomeration of the Pt/C shadowing grain, hence this variation is discourage.

For purely SEM work, since the cellulose acetate replica is not known for its beam insensitivity, and if only lower magnification views are contemplated (e.g. less than 700X), then one should consider as an alternative, the [SPI Wet Replica Kit](#). However, we do want to stress that one should not attempt to use this kit for magnifications higher than 700X or structure from the replicating system, instead of from the surface being replicated, will be seen. But when the researcher is interested in lower magnifications, the resulting positive replica becomes the ideal sample for SEM examination.

Revised: EJJ

Date: 4/24