CSAR PROCESS

CSAR resist from Allresist gmbh is very similar to ZEP, but it costs a lot less. It is a copolymer of methyl methacrylate and alpha-methyl styrene. Physically this resist is similar to PMMA, but it has better etch resistance because it has a higher glass transition temperature. That means you can hit it with a higher power plasma before it melts. The etch resistance is not dramatically higher than that of PMMA, so don't get your hopes up. Note that CSAR and ZEP swell a lot more than PMMA during development, and so CSAR and ZEP will form stress cracks if the resist film is more than about one micron thick. We stock CSAR that spins to 400 nm. If you need a thicker film, use PMMA.

1. Spin CSAR. "CSAR 62" also known as "AR-P 6200.13" spins to about 400 nm at 4 krpm. Or you could use the thinner solution found in bottles labeled "CSAR 150". The thinner solution spins to 150 nm at 3 krpm. Spin for one minute or until the film looks uniform.

   Bake at 180°C for 2 minutes on a hotplate. Bake time and temperature are not critical. Confirm the thickness by scratching with tweezers, then using a stylus profilometer (Dektak or Alphastep).

2. Expose at 100 kV. Typical large-area dose is 400 $\mu C/cm^2$
   Be sure to include the standard dose test on every substrate.
   The dose is lower than that of PMMA, but your exposures will not be faster. This is because the e-beam is usually clock-limited, not current-limited. In other words, when using PMMA you simply crank up the exposure current.

3. Development: There are many good developers for CSAR. The YINQE lab does not supply any of them, because everyone has their own random preference. Buy your own favorite developer and keep it in your own lab. Dispose of the waste by following the university's EHS guidelines.

   A typical high-resolution developer is xylene, at 10°C. Keep the developer and a beaker in a refrigerator, or create your own low-temperature bath using a water chiller. Unlike IPA-water developer, xylene must be used in a fume hood. Blow or spin dry. Do NOT rinse.

   Alternatively you could use the same IPA-water developer as we use for PMMA. This is less popular than other developers because it has not been published (probably?)

4. Liftoff: use warm NMP, 150°C after evaporating metal.

5. Etching: low-power recipes used with PMMA will work even better with CSAR. Or, you can crank up the power a bit.

6. Stripping the resist: use warm NMP or an oxygen plasma. Typical parameters for oxygen are: 30 sccm oxygen, 30 mTorr, 200W, 2 minutes.