

There are several possibilities for photoresist adhesion problems. Fortunately most are easily corrected. It very well could be that the wafers are either over or under primed. Overpriming usually happens with new types of resist that have very different molecular weight from the old, well established resist process. High resolution resists may have much lower mass and may need significantly shorter priming cycles.

There are a couple of ways of checking your coating. Depending on the type of resist coating equipment you have, you may be able to watch the resist spread during dispense. On an overprimed wafer, the resist will just ball up and run off the wafer instead of spreading out nicely. Another way of monitoring the coating is to stop the process after spread (before the ramp to final spin speed) and look to see if the resist has wetted the entire surface of the wafer.

When experiencing a photoresist adhesion problem, it is good to check the following:

- **Is the substrate up to temperature?** While the priming reaction is very forgiving to temperature variation, the substrate does need to be hot enough to get rid of molecularly bound water. Heat transfer can be a critical factor. Substrates in a Teflon® cassette may take twice as long to reach temperature as in a metal cassette. You may want to attach a thermocouple to a wafer and watch the temperature rise in the oven.
- **Is the HMDS in date?** Though it is kept under vacuum to minimize any reaction, it will degrade over time. If the HMDS is more than a year old, it should probably be replaced. A flask of HMDS on a system with occasional use can last a LONG time, so it may be worth checking. Old HMDS will have a strong ammonia smell as it breaks down. Fresh HMDS will have a much more mild odor.
- **Is the system leak tight?** Door seal maintenance is often overlooked on these systems because they look fine, but an air leak could interfere with the priming. Replacing the door seal is an inexpensive way of ensuring proper machine performance. Also, does the flask hold vacuum? If there is any compromise to the seal integrity of the HMDS flask, the chemical will break down rapidly and not give effective priming.
- **Is the system turned off between uses?** If it is, make sure to allow enough warm up time for the system temperature to equilibrate. This ties in with the substrate temperature, but sometimes "underpriming" is really an under temperature of the wafers.
- **Are the resist softbake conditions OK?** Thick resists and polyimides require a slow ramp and long bake out to adequately remove the solvent from the coating. If the wafer is set on a hotplate without a proximity bake, the resist may outgas severely and lose adhesion. Similarly, if the softbake is too short, the residual solvent may cause imaging problems. The problem may not show up until after imaging or develop.
- **Is your surface heavily phosphorous doped?** A high concentration of phosphorous acts as a catalyst for the HMDS reaction, and you may need to reduce your process time.

If you still encounter issues, we invite you to ask a question.