

1 Photolithographie

1.1 Photoresist

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There are two types of photoresist, positive and negative resist, which are used in different applications. In positive resist, the exposed areas are solubly, in negative resist the exposed areas are insolubly for wet chemical development.

Characteristics of positive resists:

- + excellent resolution
- + stable against developers
- + can be developed in aqueous developers
- bad resistance in etching or implantation processes
- bad adhesion on the wafer

Characteristics of negative resists:

- + high sensitiveness
- + fair adhesion
- + excellent resistance against etch or implantation processes
- + cheaper than positive resists
- lower resolution
- organic developers are needed (toxic)

For patterning of wafers in manufacturing, almost only positive resists are used. Negative resists were primarily used as a passivation which can be cured by ultra-violet radiation. If there is no specification in the text, a positive resist is the subject.

1.1.2 Chemical composition

Photoresists are composed of adhesive agents, sensitizers and solvents.

- **Binders (20%):** As a binder Novolac is used, which is a synthetic resin to control the thermal characteristics of the resist.
- **Sensitizer (10%):** Sensitizers define the photosensitivity of the resist. Sensitizers are composed of molecules which affect the solubility of the resist if it is exposed to energetic radiation. Thus the lithography has to take place in areas with ambient light which has a low energy.
- **Solvents (70%):** Solvents define the viscosity of the resist. By annealing, the solvent is vaporized and the resist is stabilized.

A resist, as it is provided from vendors, has a defined surface tension, density and viscosity. For this reason the thickness of the resist layer in wafer fabrication depends on the temperature and the rpm of the coating tool.