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Lithography in ic fabrication

Lithograph, which is also called optical lithography or UV lithograph, is a process used in the microfrequication to model parts of a thin film or most of the substrate. Use the light to transfer a geometric pattern from a photomask to a "pomerist" chemical sensitive to light, or simply "resist" on the substrate. A series of chemical treatments therefore affect the display model in the material or allows the deposition of a new material in the desired model on the material under the photo resist. For example, in complex integrated circuits, a modern CMOS wafer will pass through the photolithographic cycle up to 50 times. Photolithography shares some fundamental principles with photography as the model in the incision resist is created by exposing it to light, directly (without using a mask) or with a projected image using an optical mask. This procedure is comparable to a high-precision version of the method used to make printed circuits. The subsequent phases of the process have more common with engraving than the lithographic print. It is used because it can create extremely small models (up to a few dozens of sized nanometers), it offers an exact control over the shape and size of the objects that creates, and because it can create models on an entire surface effectively. Its main disadvantages are that it requires a flat substrate to start, it is not very effective in creating forms that are not flat and can request extremely clean operating conditions. Photolithography is the standard method of the printed circuit (PCB) and the manufacture of the microprocessor. A single photolithography iteration combines several passages in sequence. The procedure described here omits some advanced treatments, such as thinning agents or removal of the edge heels. Cleaning If organic or inorganic contamination is present on the surface of the wafer, they are usually removed from the wet chemical treatment, eg. The RCA Clean procedure based on hydrogen peroxide solutions. Other solutions made with trichlorethylene, acetone or methanol can also be used to clean. Preparation of the surface The wafer is initially heated at a temperature sufficient to drive away any humidity that can be present on the surface of the wafer, it is sufficient 150 Â ° C for ten minutes. Waders that have been in storage must be chemically cleaned to remove contamination. A liquid or gaseous "promoter" promoter, typically silanes like amine bis (trimethylsilyl) ("hexamethyldisilazane", hmds), is applied to promote the adhesion of the photoresist to the wafer. The surface layer of silicon dioxide on the wafer reacts with HMDS to form tri-methyl silicon dioxide, a highly water repellent repellent layer not unlike wax layer on a car's paint. This water repellent layer prevents the aqueous developer from penetrating between the photoresist layer and the surface of the wafer, thus preventing the so-called lifting of small photoresist structures in the model (developing). In order to guarantee the development of the image, it is better covered and positioned on a hot plate and let it dry while stabilizing the temperature at 120 Â ° C. Photoresist application The wafer is covered by photoresist with rotating coating. A viscous and liquid photoresist solution is delivered to the wafer and the wafer is quickly turned to produce a layer evenly. The rotating coating typically works from 1000 to 6000 rpm for 30 to 60 seconds and produces a thin uniform layer. This uniformity can be explained by the detailed modeling of the mechanical fluid, which shows that the resist moves much faster at the top Level with respect to the fund, where the viscoelastic forces bind the resistant to the wafer surface. Therefore, the upper layer of the resistance is expelled quickly from the edge of the wafer while the lower layer is slowly cursed radially along the wafer leaving a very flat layer. The final thickness is also determined by the evaporation of liquid solvents from the resist. For very small and dense features (

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