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Dry and Wet Chemical Etching Techniques for Patterning Silicon Surface

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Abstract- Micro electro mechanical systems (MEMS) technology enables us to create any pattern with any dimension. There are many surface patterning techniques which help us transfer the desired pattern from mask to the wafer surface. Predefined patterns on the wafer surface should be exposed to some chemical processes in order to obtain a depth value. Depending on the patterning type (periodic or random), and the surface properties it is possible to follow pattern transfer process with either dry plasma etching or wet chemical etching. Both techniques may end up with failure, if the process parameters aren't correctly defined. In order not to end up with failure, process parameters should be optimized carefully depending on the size, distribution, electrical properties of the surface, orientation of the wafer, and the concentration of the chemicals to be used in reactions. We have applied dry plasma etching and metal assisted etching techniques on differently oriented wafer surfaces. The wafer surfaces, which were subjected to both dry and wet etching techniques, were checked with scanning electron microscope (SEM) images. It has been obtained that we could manage to obtain the desired dimensions same as the designed mask.

Keywords- micro electro mechanical systems, dry plasma etching, reactive ion etching, wet chemical etching, metal assisted etching