

CLAIMS

What is claimed is

1. An apparatus for catalyst influenced chemical etching, comprising:
 - a process chamber to house a semiconductor wafer; and
 - one or more actuators configured to control one or more environmental properties at one or more locations on the semiconductor wafer, wherein the one or more environmental properties comprise temperature, vapor pressure, electric field, etchant concentration, etchant composition and illumination,
 - wherein the catalyst influenced chemical etching is performed on the semiconductor wafer patterned with lithographic structures, wherein a surface of the semiconductor wafer is exposed in areas without the lithographic structures, wherein a catalyst is deposited on the exposed semiconductor wafer surface, wherein the semiconductor wafer and the catalyst are exposed to an etchant in the apparatus, and wherein the catalyst leads to etching solely in regions where the catalyst was deposited on top of the exposed semiconductor wafer surface.
2. The apparatus as recited in claim 1, wherein actuators of the one or more actuators configured to control temperature comprise one or more of the following: thermal chucks, micromirrors and electrodes to locally heat a solution.
3. The apparatus as recited in claim 1, wherein the process chamber comprises an electrode on one or both sides of the semiconductor wafer.
4. The apparatus as recited in claim 3, wherein the electrode is designed to allow transmission of light to one or both sides of the semiconductor wafer.
5. The apparatus as recited in claim 1, wherein a current state of catalyst influenced chemical etching (CICE) is determined *in-situ* using optical metrology on one or more of the front and back of the semiconductor wafer.
6. The apparatus as recited in claim 1, wherein an etchant is in vapor state.

7. The apparatus as recited in claim 1, wherein an etchant is in liquid state.
8. The apparatus as recited in claim 1, wherein a rinsing station is used to remove an etchant.