## Area of use

Cr-etch-200 is an alkaline etchant for Cr. The etchant is used for the wet-chemical patterning or removal of thin Cr layers with selectivity to metals like Au, Pt, Cu, Ni, Ti, Ta. Common areas of use are for semiconductor fabrication or microsystem technology, e.g. for the removal or patterning of a Cr barrier or adhesion layer in a plating seed stack.

## Advantages and Requirement Profile

Cr-etch-200 is compatible with common resist, shows very low undercut (in the dimension of the layer thickness) under a resist mask pattern and offers selectivity to numerous materials.
Cr-etch-200 is very useful for the patterning of Cr layers using resist mask patterns or for the selective removal of seed layers after plating process steps, where plated feature must not be attacked by etchants. Cr-etch-200 is available in different purity grades. The etchant can be used at room temperature and is easy to handle.

Cr-etch-200 fits to the following requirement profile:
- Low undercut (in the range of the layer thickness), minimum feature size < 1µm
- Selectivity to many materials, e.g. common metals used in electroplating industry
- Available in different purity grades
- Compatible to resist masking
- Use at room temperature

## Inteded Use

- Usable for manual process, tank or etching equipment
- Use in laboratory or production environment only
- Use for commercial application only

## Selectivity

Cr-etch-200 is compatible/etches selective to following materials:
- Resists: common Novolak as masking resist (e.g. AZ® Photoresist)
- Metals: no attack on Au, Pt, Cu, Ni, Ti, Ta; TiW with limitations
- Semiconductor materials: Si, SiO2, Si3N4

(further information an request)

## Etching rate / capacity

Under normal condition, the etching rate is around 12 to 15nm/min (at RT).
A sputtered 30nm Cr layer is etched in about 150 seconds. The mixed etching solution is stable over time and can be used multiple times depending on the requirements of application. It is recommended to dispose the solution at the latest, when the etching rate has changed by 20%.

## Order number / Article number/ Shipping form

Cr-etch-200 is shipped ready for use.
As a standard, all compounds used are level „extra pure“.

Order number: Article number + Container-Code

| | Article number | Container-Code | | | | |
|---|---|---|---|---|---|---|
| | | 1l | 2,5l | 5l | 10l | 20l |
| Cr-etch-200 (ready-to-use) | 101200-40 | D | E | F | G | H |

On request: - Certificate of Analysis with individual requirements regarding elements
- etching solution in other purity grade or special grade regarding specific elements

## Mixture

Cr-etch-200:
The solution is shipped ready for use.

## Etching conditions

| | |
|---|---|
| Temperature: | room temperature (RT) |
| Tank: | Tank for batch process, Petri dish for manual application |
| Agitation: | medium;<br>Circulation; stirring bar; autom./ man. agitation of work piece |
| Etching rate: | 12 to 15nm per minute (at RT) |
| Pretreatment: | where applicable descum / oxygen plasma for improving the wetting properties of resist or metal mask (no wetting agents needed) |

## Etching result / inspection

The completed removal of the Cr can be identified by visual observation. There should be no visible residue of Cr, which should be verified by inspections with optical microscope.

## General application notes

### Pretreatment

Substrates should be pretreated in oxygen plasma, in order to remove any potential organic residues and to improve the wetting properties of the solution on resist masks. The surface is getting hydrophilic and no extra wetting agents are required.

### Etching process

During the etching process, sufficient agitation of the solution or of the substrate is needed. If used in manual processing, the etching time required can be identified by observing a color changeover in the open etching areas and. After visual qualification the etching should be continued for 10% bis 15% of the time elapsed, in order to assure the removal of any residues.

Post treatment
Thorough cleaning with DI-water / quick dump
Rinsing dryer or manually drying with nitrogen nozzle

## Example of process sequence

In the left column, a common process with usual undercut is depicted. In the right column, a process without significant undercut using the Cr-etch-200 solution is depicted.

After a patterned plating step, the seed layer of Cr/Au needs to be etched, in order to separate the plated features electrically. Using the Cr-etch-200, no significant undercut occurs. A process using photo resist yields corresponding results.

| | | |
|---|---|---|
| 0. Au layer deposition (and adhesion layer of Cr) | Au Cr Si | Au Cr Si |
| 1. Photo resist pattern for electroplating<br>2. Plasma treatment | PR | PR |
| 3. Electroplating (e.g. Ni) | | Ni |
| 4. Resist removal | | |
| 5. Wet etch of Au seed (and adhesion layer removal) | | |
| | **Common** etch process showing high undercut | Etch process using **Cr-etch-200** showing least undercut<br><br>(undercut of Au layer can be minimised using Au-etch-200) |

## Know issues / trouble shooting

Inhomogeneous etching result / incompleted etching

- Poor wetting / no descum or plasma executed
- Etching solution /etching capacity is consumed
- Not enough agitation

Poor resolution / high undercut

- Poor adhesion of resist
- Excessive etching time

## Safety and disposal notes

This mixture is classified as hazardous substance according to international regulations. Refer to the safety and handling recommendations of the material safety datasheet before use.

Do not empty into drains or the aquatic environment. Collect used or unused solution in containers and perform waste disposal according to official state regulations.
Cleaned containers may be recycled.

## Technical Support

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