

InP/InGaAs WET ETCH SOP

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NOTE: THE HBr SOLUTION IS NOT COMPATIBLE WITH MANY POLYMERS. USE GLASS CONTAINERS ONLY! Do not perform this operation if you do not have a buddy in the cleanroom.

1. It is suggested that this operation be started within 30 minutes of the completion of a hard bake from the photolithography process.
2. Before preparing the etchant put on the appropriate personal protection equipment (PPE) of a blue chemically resistant apron, face shield and chemically resistant orange gloves.
3. Use only analytical grade hydrobromic acid (HBr), hydrochloric acid (HCl), hydrogen peroxide (H₂O₂) and de-ionized water. Assemble clean glass beakers (Pyrex) as required, since plastic containers are not compatible.
4. In a fume hood, pour 50 parts DI water into a Pyrex beaker. Add 10 parts HBr, 5 parts HCl and finally 1 part H₂O₂ in order of decreasing volume. Stir the mixture thoroughly using a glass rod or magnetic stirrer.
5. Continue mixing until the solution becomes pale yellow. Cover the beaker with Parafilm™, affix a warning label and allow it to age undisturbed for 30 minutes to complete the formation of Br₂.
6. After the 30-minute aging period, the solution is ready for use. Maintain the solution at approximately 25 °C to ensure consistent etching and proceed promptly as the etch rate is time-dependent.
7. Carefully immerse the InP or InGaAs sample (or similar III-V materials) into the aged solution and gently agitate the beaker to promote uniform etching. Because the mixture simultaneously etches InP and GaInAs/AlInAs, monitor the etch closely.
8. The etch rate is highly sensitive to the HBr and H₂O₂ concentrations and varies with each batch. Prior to etching critical devices, estimate the etch rate by briefly etching a dummy wafer and measuring the depth with a profilometer. Use this rate to calculate the required etch time.
9. Once the desired etch depth is achieved, immediately remove the wafer and rinse it thoroughly in a quick-dump-rinse (QDR) tank. Dry the sample in the lower spin-rinse-dryer (SRD). DO NOT USE THE UPPER SRD AS IT IS RESERVED FOR RCA-CLEAN WAFERS ONLY.
10. Use the prepared etchant within two hours of mixing (one and a half hours after the aging period); discard any remaining solution thereafter. At the end of your work pour the used etchant into the designated HBr/HCl waste container.

- 11.** Rinse the beakers and stirrers thoroughly with DI water at the acids bench and return them.
- 12.** Wash your gloves and dry them. Inspect and remove your PPE.
- 13.** Inspect the etched samples under an optical microscope or using a profilometer to confirm uniform etching and surface quality.