

Cleaning Recommendations

SUPERSiC® Parts

HF:HNO₃ PROCESS

Presoak the item in DI water for 10 minutes.

Immerse the item in the acid solution. Concentrations of the acid solution (HF:HNO₃:H₂O) can range from 1:1:10 to 1:1:1. Soak times vary depending on the thickness of the deposited film.

Rinse the item in a cascading or overflow DI rinse tank until the DI resistivity reaches original incoming levels. Rinse time can vary depending on the geometry. Typically if the item is uncoated, the rinse time may be longer as acid is drawn from the porosity.

Bake the carrier according to the following procedures:

Oven Bake: Dry for 4 hours at 150°C followed by at least 2 hours at between 250 and 400°C.

Furnace Bake: Install carrier and ramp the furnace to 400°C over a period of 4 hours and hold at this temperature for at least 2 hours.

RCA CLEANING PROCESS

5:1:1 to 7:1:1 H₂O:H₂O₂:NH₄OH at 75°C to 85°C for between 5 and 15 minutes.

5:1:1 to 8:2:1 H₂O:H₂O₂:HCl at 75°C to 85°C for between 5 and 15 minutes.

DI overflow rinse as described in the HF clean process.

Dry the item using one of the same drying methods as described in the HF clean process.

NOTES:

HF concentration 49%

HNO₃ concentration 70%

For gate oxidation or implant drive operations, it may be necessary to perform a high temperature HCl steam clean.

ETCH RATES:

POCO has conducted tests for cleaning Si₃N₄ and Poly-Si depositions from both horizontal and vertical SUPERSiC carriers. Due to the nature of the conversion process, in which there is no Si backfill, it is possible to use stronger acids than typically used for cleaning both quartz and sintered SiC.

An experiment was conducted using commercially available Si₃N₄ deposited on 150 mm wafers. The etch solution used was a 1:1:1 HF:HNO₃:H₂O solution. The etch rate obtained with this process was 150 Å/min.

An additional experiment was conducted with a stronger 1:1 HF:HNO₃ solution, and the etch rate obtained for thermal Si₃N₄ was 350 Å/min. For Poly-Si deposition, which was deposited at a relatively low temperature (600°C), the etch rate obtained in the 1:1:1 HF:HNO₃:H₂O solution was 2 µ/min. For the stronger 1:1 HF:HNO₃ solution, the etch rate was over 3 µ/min.

When calculating an etch time for cleaning SuperSiC carriers, it is important to know the amount of deposition that is on the carriers. With that amount and the etch rate in the corresponding acid solution (shown above), an etch time can be calculated to remove all the deposited film from the carrier. In addition, the time should be doubled to include a 100% overetch. The clean should be accomplished according to the POCO recommended cleaning procedure.

© POCO Graphite, Inc. 2004 All rights reserved.

POCO
GRAPHITE