Foamtec International
Wilshire Contamination Control Division
cleaning critical surfaces

BEFORE **AFTER**

VACUUM CHAMBER PM TECHNIQUE
NOVELLUS HDP SPEED 3 DOME SCRUB

OBJECTIVE:

TO EFFECTIVELY AND TIMELY PM THE NOVELLUS HDP SPEED 3 CERAMIC DOME IN-PLACE, WHILE MINIMIZING TOOL DOWNTIME, IMPROVING PARTICLE PERFORMANCE, TOOL RECOVERY AND REDUCING COST

Vacuum Chamber: NOVELLUS HDP SPEED 3
Vacuum Chamber Process Residue: PROCESSED INDUCED RESIDUE
Vacuum Chamber Components: CERAMIC DOME

Old Procedure: Replace dome every 10,000 wafers extended outgassing & recovery time

New Procedure: **30 MINUTES**, Foamtec International PM Kit with DI water reduced outgassing & recovery time
ELIMINATE COST OF REPLACING DOME

Vacuum Chamber Products:

NOVELLUS HDP SPEED 3 DOME PM Kit
PM Kit P/N: HT4500 – NOVDM4

- (1) HT4754 UltraSOLV® Sponge
- (2) HT4528D-10-1 280 Grit Diamond ScrubPAD
- (2) HT4790-5 UltraSOLV® Foam Wipes
- (2) HT5790S-5 MiraWIPES®

Foamtec International ErgoSCRUB® and Diamond ScrubDISK® may be included if desired

NOVELLUS HDP SPEED 3 *IN-PLACE* DOME PM PROCEDURE (CONT'D):

View "How to" instructional videos on http://www.foamtecintlwcc.com/flash/

Step 1: Using proper procedures and **safety guidelines** to prepare Novellus Speed 3 Dome for wet clean

Step 2: Stage a small container of DI water inside a large plastic bag next to Speed 3 equipment

Step 3: Place HT4754 UltraSOLV® Sponge, ErgoSCRUB® w/ScrubDISK® and ScrubPAD in container of DI water to moisten products (See Fig 1)

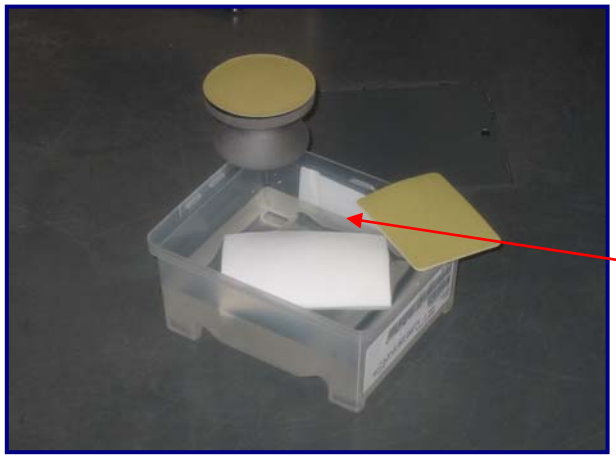


Fig 1: Foamtec International products in small container of DI water

Step 4: Use dampened UltraSOLV® Sponge to wipe out the Novellus Speed 3 ceramic dome, removing all loose deposition or flakes. Continue to re-moisten the UltraSOLV® Sponge in container of DI water and wipe HDP dome until as much of the deposition as possible has been removed with UltraSOLV® Sponge (See Fig 2 & 3)

Fig 2: UltraSOLV® Sponge performing initial wipe of ceramic dome

Fig 3: UltraSOLV® sponge removing loose deposition

NOVELLUS HDP SPEED 3 *IN-PLACE* DOME PM PROCEDURE (CONT'D):

Step 5: After wiping of dome with UltraSOLV® Sponge is completed, use dampened 280 Grit Diamond ScrubPAD and scrub areas throughout the Novellus ceramic dome (See Fig 4)

May use ErgoSCRUB® with 280 Grit Diamond ScrubDISK® if desired (See Fig 5)

Fig 4: 280 Grit Diamond ScrubPAD scrubbing ceramic dome

Fig 5: ErgoSCRUB® with 280 Grit Diamond ScrubDISK® scrubbing

Step 6: As loose deposition begins to build up within the ceramic dome, take UltraSOLV® Sponge and wipe the area free of deposition (See Fig 6 & 7)

Fig 6: UltraSOLV® Sponge wiping area free of deposition

Fig 7: UltraSOLV® sponge loaded with deposition

NOVELLUS HDP SPEED 3 *IN-PLACE* DOME PM PROCEDURE (CONT'D):

Step 7: Rinse sponge in container of DI water, as necessary to free UltraSOLV® Sponge of excess deposition (See Fig 8 & 9)

Fig 8: UltraSOLV® sponge loaded with deposition

Fig 9: UltraSOLV® after rinsing with DI water

Step 8: As ScrubPAD loads up with deposition, pull ScrubPAD across UltraSOLV® Sponge to unload ScrubPAD of deposition (See Fig 10, 11 & 12)

280 Grit Diamond ScrubDISK® used in picture below

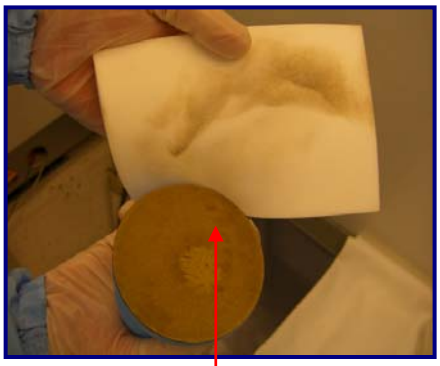


Fig 10: ScrubDISK® loaded with deposition

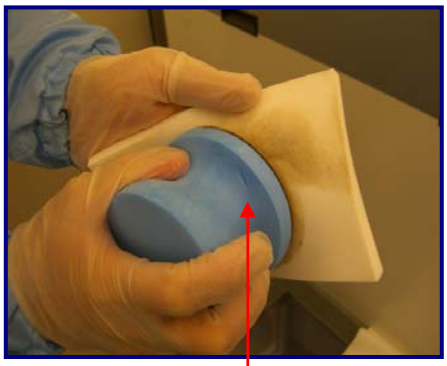


Fig 11: Pull & twist ScrubDISK® across UltraSOLV® Sponge

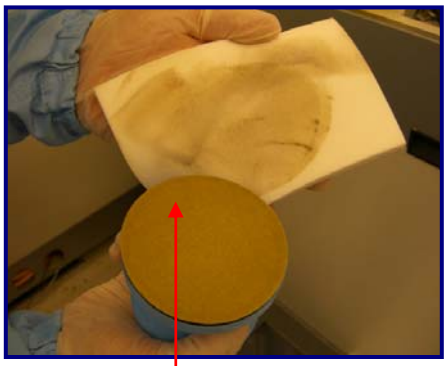


Fig 12: Unloaded ScrubDISK®

IMPORTANT NOTE: STEPS 7 & 8 ARE CRITICAL STEPS THAT MUST BE FOLLOWED THROUGHOUT ENTIRE PM

NOVELLUS HDP SPEED 3 *IN-PLACE* DOME PM PROCEDURE (CONT'D):

Step 9: Repeat steps 5 – 8, scrubbing the remaining areas of the Novellus Ceramic Dome. Rinse out UltraSOLV® Sponge and unload 280 Grit Diamond ScrubPAD onto the UltraSOLV® Sponge as necessary (See Fig 13 & 14)

Fig 13: Loaded-up UltraSOLV® Sponge

Fig 14: UltraSOLV® Sponge AFTER rinse

Step 10: Replace 280 Grit Diamond ScrubPAD with 2nd ScrubPAD when ScrubPAD begins to feel as though it is not removing any additional deposition (may not be necessary)

Step 11: Use ScrubPAD and gently remove o-ring stain along the edge of Speed 3 HDP Dome using same procedure as described above (See Fig 15)

Fig 15: ScrubPAD gently removing o-ring stain on edge of HDP dome

IMPORTANT NOTE

IT IS NOT NECESSARY TO REMOVE ENTIRE STAIN EMBEDDED IN NOVELLUS SPEED DOME. IT IS ONLY IMPORTANT TO REMOVE THE SHARP, ROUGH DEPOSITION BUILDUP THAT ACCUMULATES WITHIN DOME DURING PROCESS

NOVELLUS HDP SPEED 3 *IN-PLACE* DOME PM PROCEDURE (CONT'D):

Step 12: When dome appears to be sufficiently clean, slide Diamond ScrubPAD over the entire dome using the back of your hand. Listen for any areas that may still appear rough or sharp and scrub accordingly. *If you feel any rough areas and hear any scratching, those areas need to be re-scrubbed*

Step 13: When deposition throughout entire Novellus Ceramic Dome has been sufficiently removed, rinse out UltraSOLV® Sponge with fresh DI water and re-wipe the entire dome in preparation for FINAL WIPE PROCEDURE

NOVELLUS CERAMIC DOME FINAL WIPE PROCEDURE:

IMPORTANT NOTE

AS THE NOVELLUS CERAMIC DOME IS AN EXTREMELY PARTICLE SENSITIVE AREA, THE FINAL WIPE PROCEDURE MUST BE FOLLOWED IN ITS ENTIRETY TO MAXIMIZE TOOL RECOVERY BENEFITS

Step 14: Use HT5790S MiraWIPE® moistened with DI water and wipe out entire area of HDP dome. Plan to use (5) MiraWIPES® for this application (See Fig 16)

Fig 16: HT5790S MiraWIPE® with DI water wiping dome

NOVELLUS HDP SPEED 3 *IN-PLACE* DOME PM PROCEDURE (CONT'D):

Step 15: Use a HT4790 UltraSOLV® Foam Wipe folded into quarters and moisten a small area with DI water (See Fig 17 & 18)

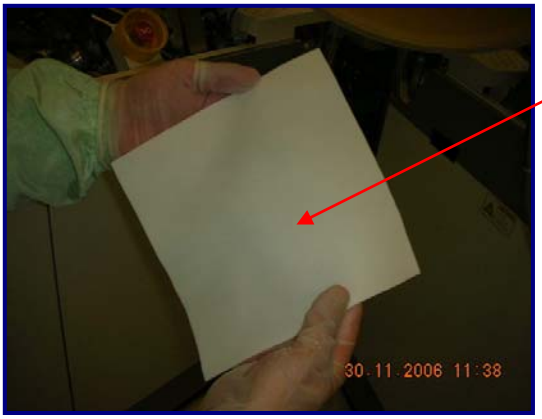
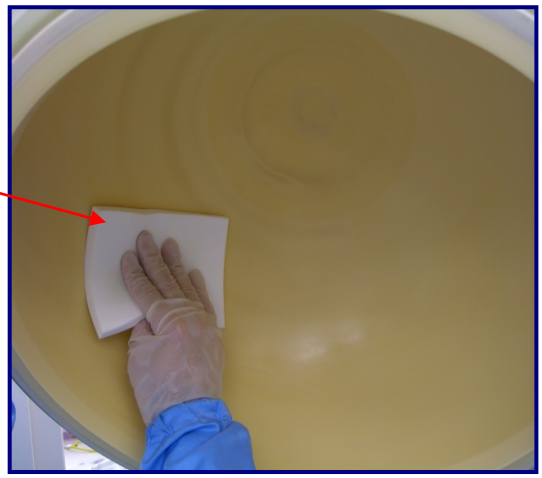


Fig 17: HT4790 UltraSOLV® Foam Wipe

Fig 18: Moistening UltraSOLV® Foam Wipe with DI water

Step 16: Using the dampened area on UltraSOLV® Foam Wipe, wipe dome by **GENTLY PULLING** Foam Wipe in one direction across an area on dome (See Fig 19)

Fig 19: UltraSOLV® Foam Wipe pulling across ceramic dome



Step 17: Refold UltraSOLV® Foam Wipe to a clean section and re-moisten a new small area on Foam Wipe with IPA and wipe by pulling Foam Wipe in one direction only across another area within dome

Step 18: Continue to refold UltraSOLV® Foam Wipe to use a fresh area on the Foam Wipe for every wipe across the dome

Step 19: Repeat steps 15 – 18, using all of the remaining UltraSOLV® Foam Wipes, re-wiping all areas as necessary

NOVELLUS HDP SPEED 3 *IN-PLACE* DOME PM PROCEDURE (CONT'D):

Step 20: If N_2 or CDA (clean dry air) is available, blow out the Novellus Ceramic Dome to remove any remaining moisture and loose particles

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IMPORTANT NOTE:
UPON COMPLETION OF HDP DOME FINAL WIPE PROCEDURE, IT IS CRITICAL TO EFFECTIVELY WIPE OUT **NOVELLUS SPEED 3 PROCESS CHAMBER** WITH REMAINING HT5790S MiraWIPES® TO MAXIMIZE TOOL RECOVERY BENEFIT

NOTE: Fig 18 shows how much more deposition the Foamtec International MiraWIPE® can remove from the Novellus Speed 3 Chamber as compared to the standard fab wiper, making the MiraWIPE® Final Wipe Procedure the most **CRITICAL STEP** of the PM procedure (See Fig 20a &20b)

Fig 20a: What the MiraWIPE® was able to remove, AFTER the standard fab wiper

Fig 20b: The last standard fab wiper used to wipe the chamber

MiraWIPES® are the KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY

Step 21: Use the remaining HT5790S MiraWIPES® moistened with fresh DI water to wipe the entire Novellus Speed 3 Chamber as necessary

Step 22: Use the HT5790S MiraWIPES® to wipe down all nozzles, pump ports, view ports, vacuum sealed surfaces, o-rings and other parts to be placed back into the Novellus Speed 3 Chamber

Step 23: If N_2 or CDA (clean dry air) is available, blow out the Novellus Chamber to remove any remaining moisture and loose particles

Step 24: Perform Novellus Speed 3 Tool Recovery as outlined by manufacturer