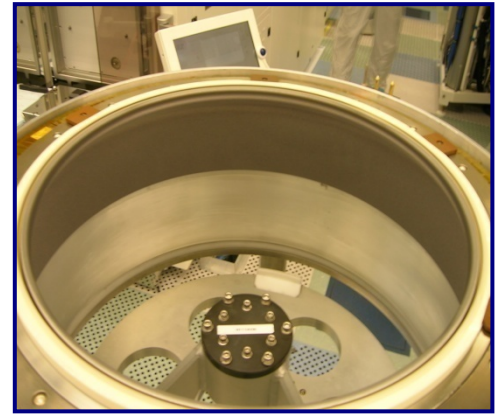


**NOVELLUS INOVA
PVD CHAMBER**



**NOVELLUS INOVA
PVD UPPER CHAMBER RING**

VACUUM CHAMBER PM TECHNIQUE Novellus INOVA PVD Process Chamber

OBJECTIVE:

TO EFFECTIVELY PM THE NOVELLUS INOVA PVD PROCESS CHAMBER IN A TIMELY MANNER, WHILE IMPROVING TOOL RECOVERY AND PARTICLE PERFORMANCE

Vacuum Chamber:

NOVELLUS INOVA PVD

Vacuum Chamber Process Residue:

PROCESS INDUCED RESIDUE

Vacuum Chamber Components:

PROCESS CHAMBER

Old Procedure:

3 to 4 hours using Scotch-Brite™ & IPA with 100+ wipes
Tool Recovery: 6 to 8 hours conditioning wafers to pass particle specs

New Procedure:

1 to 2 hours using ScrubPAD, UltraSOLV® Sponge DI water & IPA with 25 MiraWIPES®

Tool Recovery: <4 hours conditioning wafers to pass particle specs

Vacuum Chamber Products:

NOVELLUS INOVA PVD CHAMBER PM KIT

- (3) [HT4536D](#)-10-1 360 Grit Diamond ScrubPAD
- (1) [HT174936D](#)-1 360 Grit Diamond ScrubTIP®
- (1) [FTPEN](#)-1 ScrubWRIGHT® PEN
- (1) [HT4580DW](#)-1 800 Grit Diamond ScrubBELT®
- (1) [HT4754](#) UltraSOLV® Sponge
- (4) [HT1511FC](#)-5 MiraSWABS® (20 MiraSWABS®)
- (1) [HT5790S](#)-25 MiraWIPES® (25 MiraWIPES®)
- (1) [HT4790](#)-5 UltraSOLV® Foam Wipers (5 Wipers)



NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE:

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

Step 1: Using proper procedures and **safety guidelines**, shutdown and prepare Novellus INOVA PVD process chamber for wet clean

INOVA UPPER CHAMBER RING SCRUB:

Step 2: Remove INOVA PVD ANODE ADAPTER from process chamber and stage on mounting assembly in preparation for wet clean (See Fig 1)

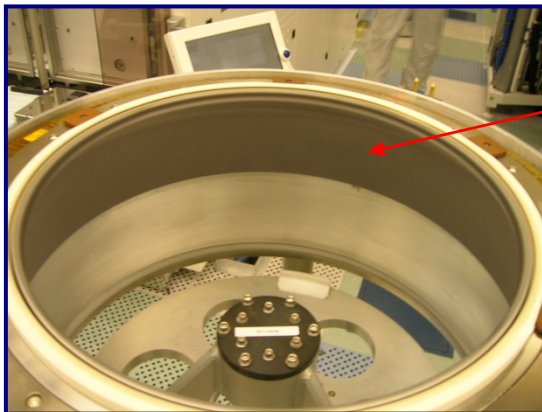


Fig 1: PVD anode adapter on target change cart

Step 3: Fill FT1301 plastic container with approximately 12oz of DI water and place on protective pad next to working area (See Fig 2)

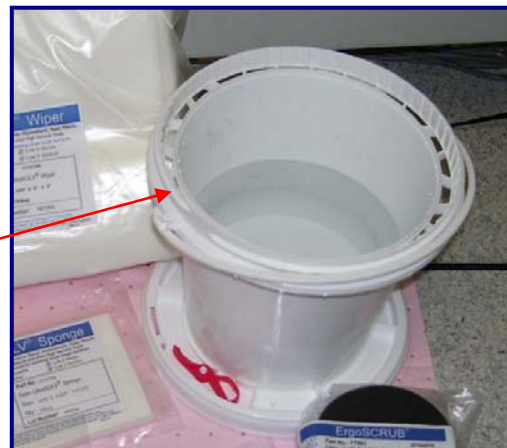


Fig 2: FT1301 plastic container with DI water

NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

Step 4: Place [HT4536D](#) 360 Grit Diamond ScrubPAD and [HT4754](#) UltraSOLV® Sponge in container of DI water to moisten products (See Fig 3)



Fig 3: Placing Diamond ScrubPAD and UltraSOLV® Sponge in container of DI water

Step 5: Use **lightly dampened** UltraSOLV® Sponge and wipe area of anode adapter that is to be cleaned (See Fig 4)

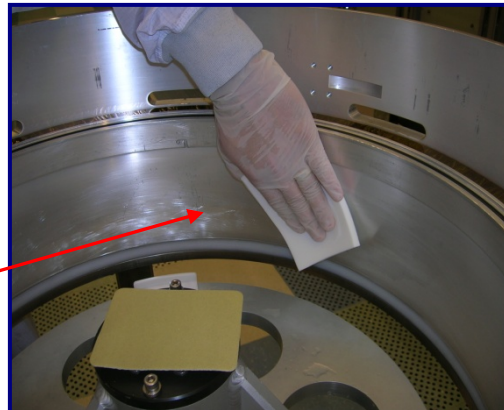


Fig 4: Lightly dampened UltraSOLV® Sponge wiping anode adapter

Step 6: Take **lightly dampened** 360 Grit Diamond ScrubPAD and scrub deposition off of anode adapter (See Fig 5)

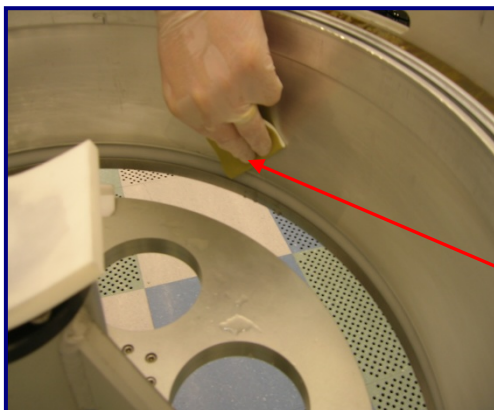


Fig 5: Lightly dampened ScrubPAD scrubbing off deposition

NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

NOTE: REMEMBER IT IS NOT NECESSARY TO USE A LOT OF DI WATER DURING THIS SCRUB PORTION OF THE PM, ONLY ENOUGH TO KEEP DIAMOND SCRUBPAD MOIST

Step 7: After scrubbing a small area with the 360 Grit Diamond ScrubPAD, use the lightly dampened UltraSOLV[®] Sponge and wipe deposition from the scrubbed area (See Fig 6 & 7)



Fig 6: UltraSOLV[®] Sponge wiping off deposition

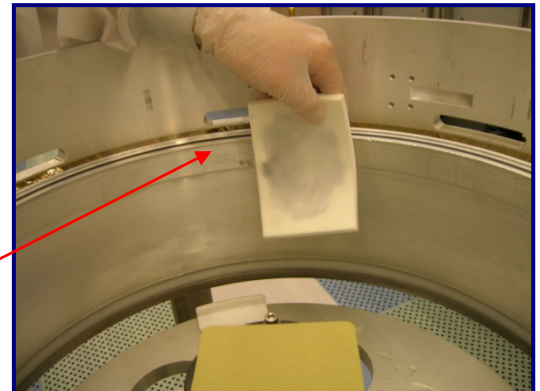


Fig 7: Deposition on UltraSOLV[®] Sponge

NOTE: THIS STEP WILL ELIMINATE THE USE OF 100+ WIPERS AS THE SPONGE CAN BE REUSED DURING THE SCRUB PORTION OF THE PM

Step 8: As Diamond ScrubPAD loads-up with deposition, pull ScrubPAD across damp UltraSOLV[®] Sponge to properly unload (See Fig 8, 9 & 10)



Fig 8: ScrubPAD loaded with deposition

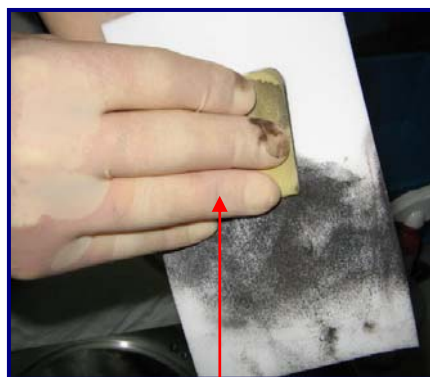


Fig 9: Pull ScrubPAD across UltraSOLV[®] Sponge



Fig10: Unloaded ScrubPAD

NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

Step 9: Ensure to unload UltraSOLV[®] Sponge as much as possible by placing it back in container of DI water and **RINSE-OUT** thoroughly (See Fig 11 & 12)

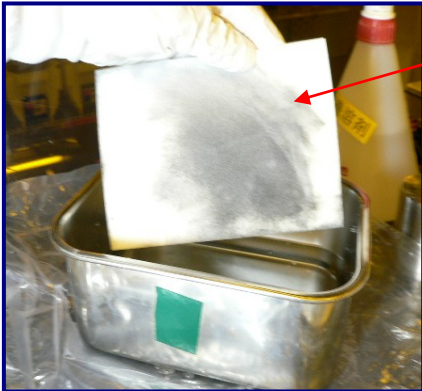


Fig 11: UltraSOLV[®] Sponge loaded with deposition



Fig 12: UltraSOLV[®] Sponge AFTER rinse

Step 10: Repeat steps 4 – 9 for all remaining areas throughout PVD anode adapter. Unload ScrubPAD and UltraSOLV[®] Sponge as necessary

Step 11: When scrub portion of wet clean is complete, prepare anode adapter for Final Wipe by rinsing out UltraSOLV[®] Sponge with fresh DI water and performing a complete final anode adapter wipe using the dampened UltraSOLV[®] Sponge

IMPORTANT NOTE

MUST USE HT5790S MiraWIPES[®] AND HT1511FC MiraSWABS[®] DURING WIPE PORTION OF PROCEDURE TO EFFECTIVELY REMOVE PARTICLE DEFECTS FROM NOVELLUS INOVA PVD PROCESS CHAMBER

NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

INOVA ANODE ADAPTER WIPE:

NOTE: Below is an example of the particles the HT1511FC MiraSWAB® was able to remove from the adapter shield pin grooves in the NOVELLUS INOVA PVD ANODE ADAPTER (See Fig 13 & 14)

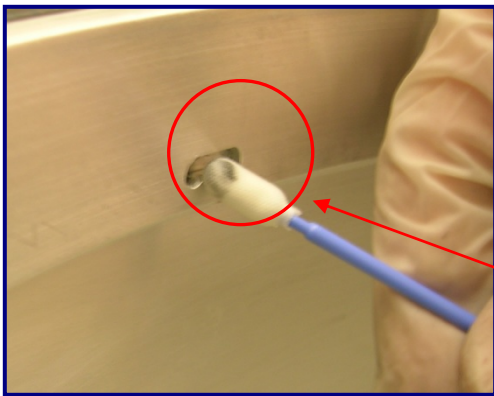


Fig 13 & 14: What the HT1511FC MiraSWAB® was able to effectively remove from upper chamber ring

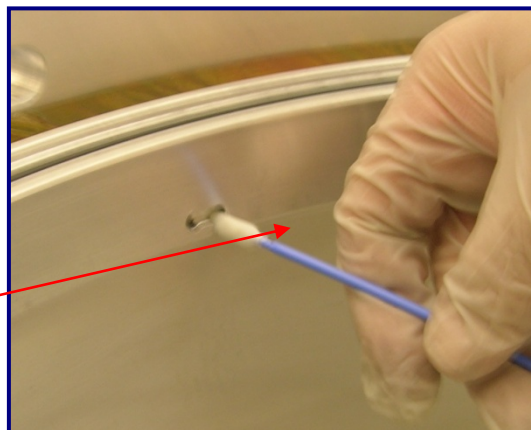


MiraSWABS® are a KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY

NOTE: Important to use HT1511FC MiraSWABS® before HT5790S MiraWIPES® as the MiraSWABS® will be lifting particles out of the hard to reach areas and will have to be followed by wiping with the MiraWIPE®

Step 12: Dampen the HT1511FC MiraSWAB® with IPA and wipe out the hard to reach areas, such as adapter shield pin grooves, o-ring grooves, screw holes and tight corners (See Fig 15)

Fig 15: MiraSWAB® wiping out adapter shield pin grooves



NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

NOTE: Figure below shows how much more deposition the Foamtec International MiraWIPE® can remove from a critical surface compared to the standard fab wiper, making the MiraWIPE® Final IPA Wipe the most **CRITICAL STEP** of the PM procedure (See Fig 16a & 16b)



Fig 16a: Current fab wiper after completely wiping process chamber

Fig 16b: Particles picked up using HT5790S MiraWIPES® after completely wiping with current fab wiper

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

Step 13: Fold the HT5790S MiraWIPE® into quarters and dampen with IPA

NOTE: **IMPORTANT TO FULLY SATURATE THE MiraWIPE® WITH IPA. THE MICROFIBER CHARACTERISTICS ARE MORE ABSORBENT AND WILL HOLD MORE IPA THAN ANY STANDARD FAB WIPER, HELPING TO PERFORM A MORE EFFECTIVE FINAL WIPE**

Step 14: Using the IPA dampened MiraWIPE®, wipe down all areas of the anode adapter, be sure to refold the MiraWIPE® as necessary to expose a clean side of the MiraWIPE® as you wipe within the chamber

NOTE: **REPLACE WITH A NEW DAMPENED MiraWIPE® AS NECESSARY**

Step 15: Repeat above MiraWIPE® & MiraSWAB® final wipe procedure on all remaining areas of Novellus INOVA Anode Adapter

NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

INOVA PVD CHAMBER SCRUB:

Step 16: Empty container of DI water in approved waste disposal sink and replace with fresh DI water (See Fig 17)

Fig 17: FT1301 plastic container with fresh DI water



Step 17: Take 2nd [HT4536D](#) 360 Grit Diamond ScrubPAD and [HT4754](#) UltraSOLV[®] Sponge and place in container of fresh DI water (See Fig 18)

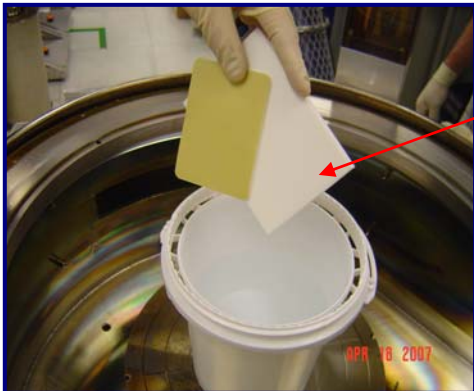
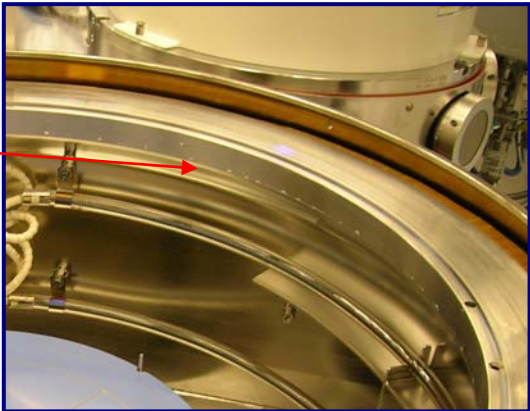


Fig 18: Placing Diamond ScrubPAD[®] and UltraSOLV[®] Sponge in container of fresh DI water

NOTE: If UPPER EDGE OF PVD CHAMBER DOES NOT CONTAIN A RING OF HARD WHITE BUILDUP THEN PROCEED TO STEP 20 (See Fig 19)

Fig 19: Ring of hard white buildup along top edge of PVD process chamber



NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

Step 18: Take **lightly dampened** UltraSOLV[®] Sponge and wipe ring of hard white buildup along top edge of PVD process chamber (See Fig 20)

Fig 20: UltraSOLV[®] Sponge wiping top edge of PVD process chamber



Step 19: Use **lightly dampened** 360 Grit Diamond ScrubPAD and scrub off hard white buildup along top edge of chamber (See Fig 21)

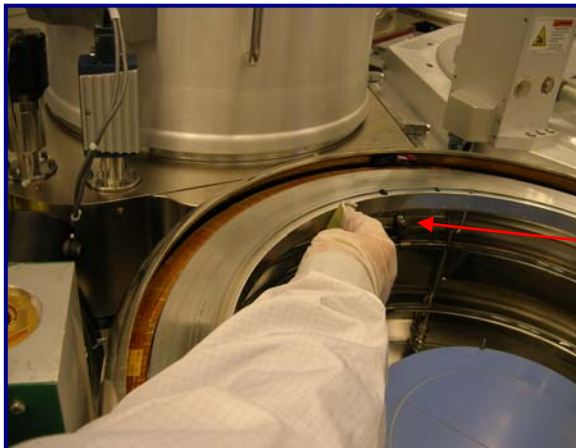
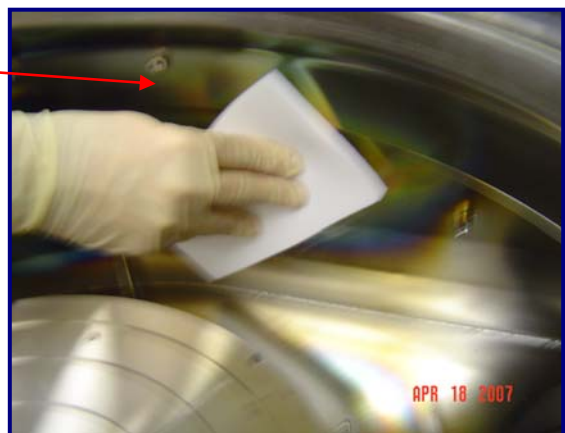


Fig 21: ScrubPAD scrubbing off buildup from top edge of chamber

Step 20: When white ring on top edge of process chamber has been removed, use the same technique with the UltraSOLV[®] Sponge and ScrubPAD to remove any process buildup throughout chamber (See Fig 22)

Fig 22: UltraSOLV[®] Sponge wiping process chamber in preparation for scrub



NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

NOTE: UNLOAD DIAMOND SCRUBPAD AND ULTRASOLV® SPONGE USING THE SAME METHOD DESCRIBED ABOVE

Step 21: For small areas and tight corners, such as the chamber flange, place the [HT4580DW-1](#) 800 Grit Diamond ScrubBELT® onto the [FTPEN-1](#) ScrubWRIGHT® Pen and scrub these areas with the tip of the ScrubWRIGHT® Pen. Use the same unloading procedure for the ScrubBELT® as described above and ensure to rotate the ScrubBELT® as necessary to prevent from breaking (See Fig 23, 24 & 25)



Fig 23 & 24: ScrubWRIGHT® PEN scrubbing along the chamber flange

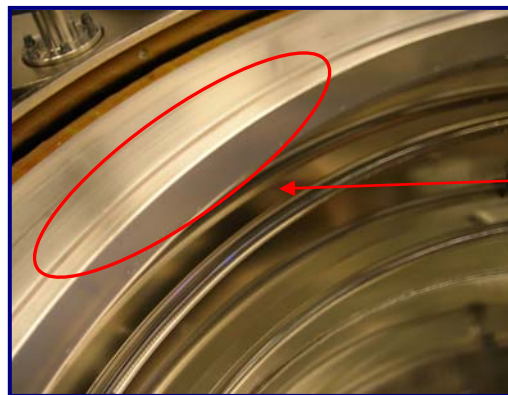
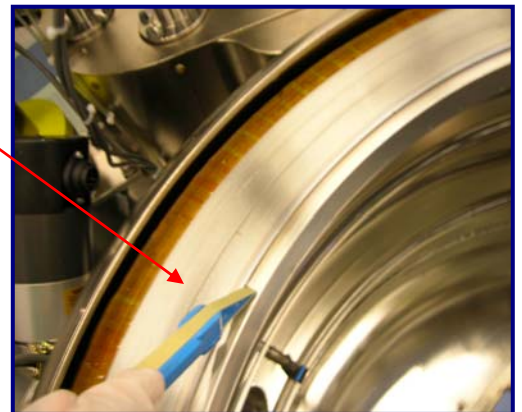


Fig 25: PVD chamber edge **AFTER** scrub

Step 22: Use a 3rd 360 Grit Diamond ScrubPAD, lightly moistened with DI water, to scrub outer edge of the ceramic e-chuck (See Fig 26)

Fig 26: Scrubbing the outer edge of ceramic e-chuck

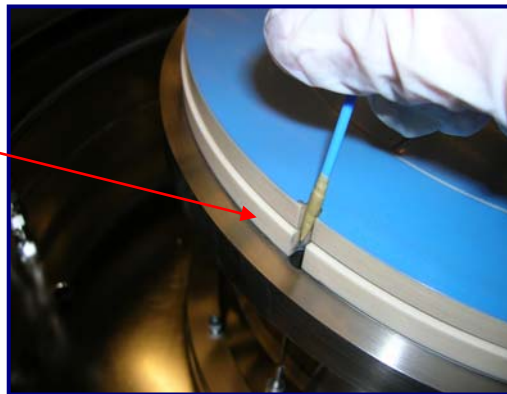


NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

Step 23: Use the UltraSOLV[®] Sponge, lightly dampened with DI water, in the same manner as described above to wipe the edge of the ceramic e-chuck

Step 24: Take a [HT174936D-1](#) 360 Grit Diamond ScrubTIP[®] to clean the lift pin holes around the edge of the e-chuck (See Fig 27)

Fig 27: 360 Grit Diamond ScrubTIP[®] cleaning lift pin holes



Step 25: In preparation for the final wipe, take a certified house vacuum and vacuum out all the areas throughout the PVD process chamber where DI water and/or particles may have accumulated (See Fig 28)

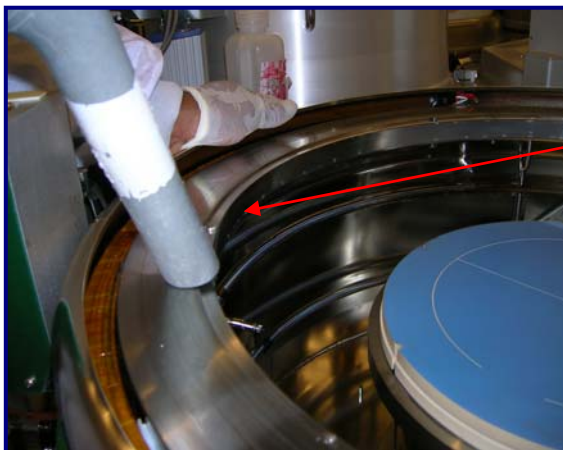


Fig 28: Using house vacuum to pull moisture and particles out of tight areas

NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

IMPORTANT NOTE

MUST USE HT5790S MiraWIPES® AND HT1511FC MiraSWABS® DURING FINAL WIPE PORTION OF PROCEDURE TO EFFECTIVELY REMOVE PARTICLE DEFECTS FROM NOVELLUS INOVA PVD PROCESS CHAMBER

INOVA PVD PROCESS CHAMBER WIPE:

NOTE: Below is an example of the particles the HT1511FC MiraSWAB® was able to remove from the hard to reach tight areas in the Novellus INOVA PVD Process Chamber (See Fig 29)

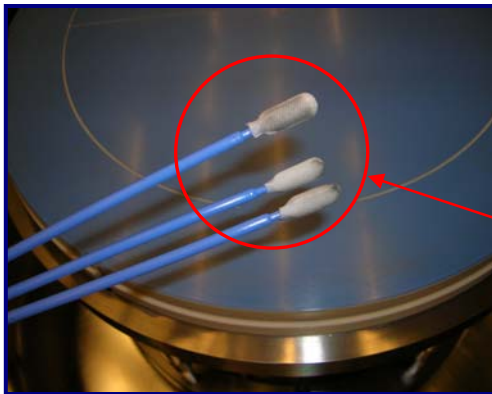


Fig 29: What the HT1511FC MiraSWAB® was able to effectively remove from PVD process chamber

MiraSWABS® are a KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY

NOTE: Important to use HT1511FC MiraSWABS® before HT5790S MiraWIPES® as the MiraSWABS® will be lifting particles out of the hard to reach areas and will have to be followed by wiping with the MiraWIPE®

NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

Step 26: Dampen the [HT1511FC](#) MiraSWAB[®] with IPA and wipe out the hard to reach areas, such as ESC lift pin holes, holes at the bottom of the chamber, PVD changer flange and o-ring grooves (See Fig 30, 31, 32, 33 & 34)

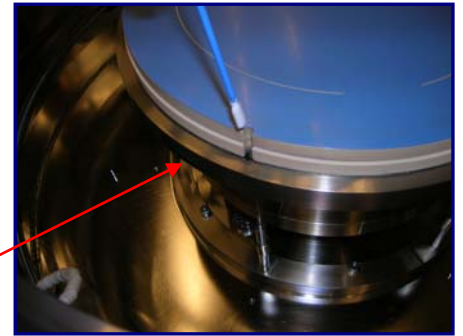
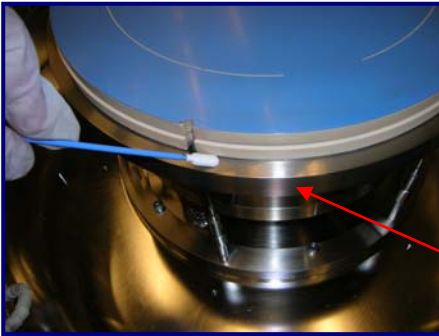
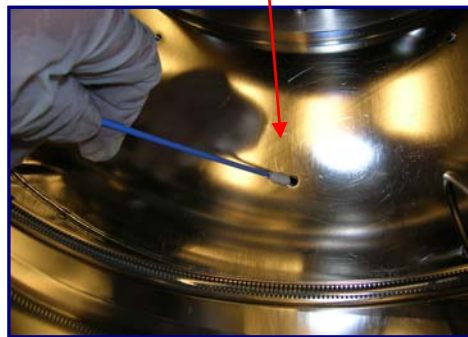
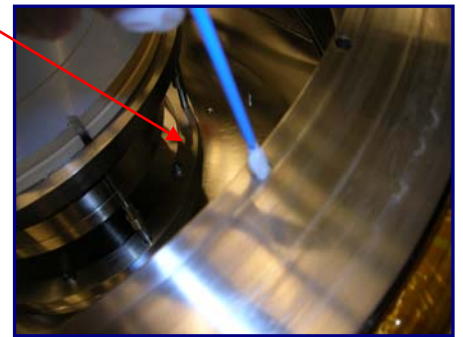
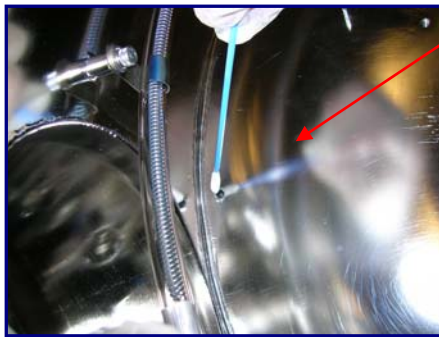


Fig 30, 31, 32, 33 & 34:
MiraSWAB[®] wiping out ESC lift pin holes, holes on bottom of chamber and PVD chamber flange



NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

NOTE: Figure below shows how much more deposition the Foamtec International MiraWIPE® can remove from a critical surface compared to the standard fab wiper, making the MiraWIPE® Final IPA Wipe the most **CRITICAL STEP** of the PM procedure (See Fig 35a & 35b)

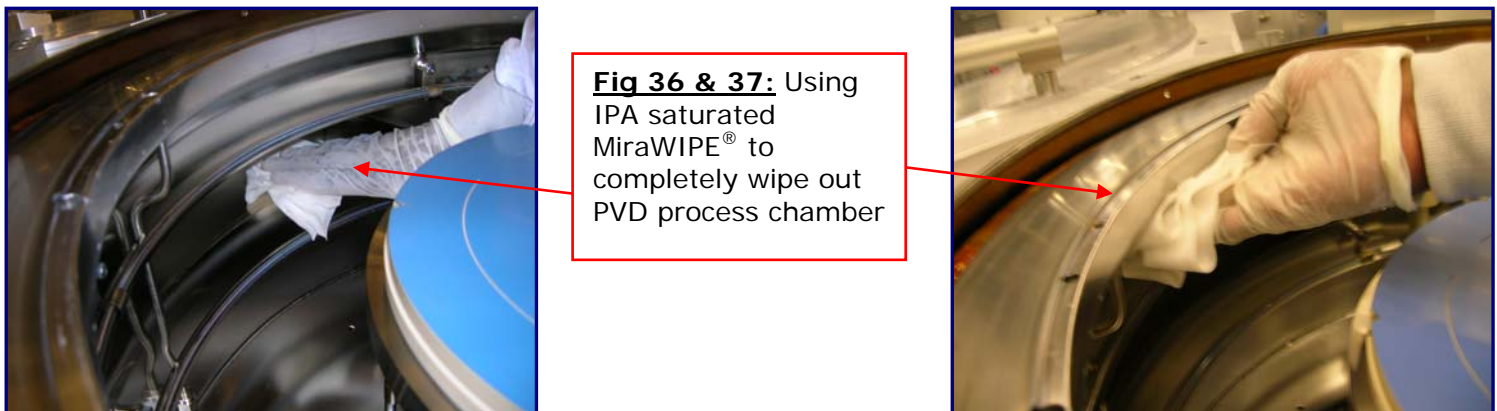


MiraWIPES® are another KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY

Step 27: Fold the [HT5790S](#) MiraWIPE® into quarters and dampen with IPA

NOTE: **IMPORTANT TO FULLY SATURATE THE MiraWIPE® WITH IPA. THE MICROFIBER CHARACTERISTICS ARE MORE ABSORBENT AND WILL HOLD MORE IPA THAN ANY STANDARD FAB WIPER HELPING TO PERFORM A MORE EFFECTIVE FINAL WIPE**

Step 28: With the IPA dampened MiraWIPE®, wipe down all areas of the PVD process chamber, including chamber pass-through; be sure to refold the MiraWIPE® as necessary to expose a clean side of the MiraWIPE® as you wipe within the chamber (See Fig 36 & 37)



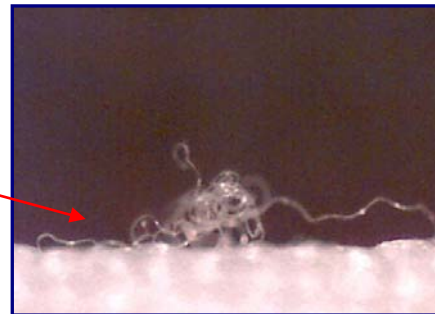
NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

NOTE: REPLACE WITH A NEW DAMPENED MiraWIPE® AS NECESSARY

Step 29: Repeat above MiraWIPE® & MiraSWAB® final wipe procedure on all remaining areas of Novellus INOVA PVD Process Chamber

NOTE: IT IS EXTREMELY CRITICAL TO WIPE THE PVD PROCESS CHAMBER CERAMIC E-CHUCK WITH THE UltraSOLV® FOAM WIPER, TO PREVENT FROM GENERATING AND LEAVING FIBERS IN THE PROCESS CHAMBER (SEE FIG 38)

Fig 38: Fiber generated from wiping e-chuck with standard fab wiper



NOTE: USING THE UltraSOLV® FOAM WIPERS IS AN EXCELLENT TECHNIQUE TO HELP MINIMIZE BACKSIDE PARTICLES

Step 30: Take the UltraSOLV® foam wiper and fold into quarters (See Fig 39 & 40)



Fig 39: UltraSOLV® Foam Wiper

Fig 40: UltraSOLV® Foam Wiper folded into quarters



NOVELLUS INOVA PVD PROCESS CHAMBER PM PROCEDURE (CONT'D):

Step 31: Dampen the UltraSOLV[®] foam wiper with IPA and wipe the top and sides of the e-chuck by **PULLING** the foam wiper across the e-chuck (See Fig 41)

Fig 41: UltraSOLV[®] Foam Wipe being **PULLED** across e-chuck



NOTE: IT IS NECESSARY TO PULL THE FOAM WIPER ACROSS THE E-CHUCK AS THE CHARACTERISTICS OF THE FOAM WIPER WILL NOT ALLOW THE WIPER TO BE PUSHED

NOTE: REFOLD FOAM WIPER AS NECESSARY TO EXPOSE A NEW AREA OF THE WIPER AFTER EACH SECTION HAS BEEN USED

Step 32: Using proper procedures and **safety guidelines** bring PVD Process Chamber back up to production