

TECHNETICS THIN FILM YTTRIA COATINGS

NEW proprietary, proven, and tested uniform surface coating extends the life of high value etch chamber components.



Thin film Yttria coating is applied to the substrate using a proprietary low temperature deposition process in a high vacuum chamber environment.

Film property modification capabilities include adhesion control, morphology, density, stress level, crystallinity and chemical composition.

APPLICATIONS

The deposition is a highly etch-resistant thin film coating that reduces particle generation and increases chamber component lifetimes.

Material	Y_2O_3
Thickness [μm]	1.0 to 6.0
Nanoindentation Hardness [HV]	523
Roughness RA [$\mu in.$]	1
Porosity	0%

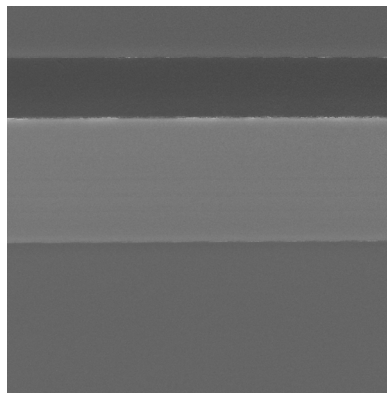
RESULTS FROM COATED SAMPLES

Coatings were deposited on various materials including high purity alumina, quartz, sapphire and silicon to determine the film's quality and performance on each material.

A sample was inspected at an independent analytical service company using scanning electron microscopy.

Cross section of the Yttria deposited film.

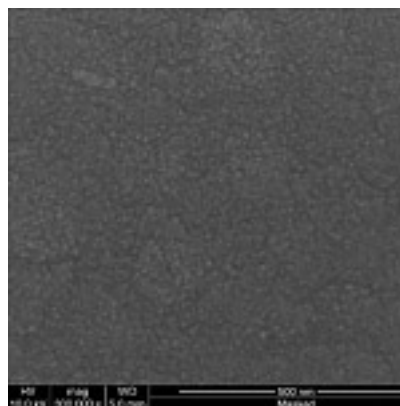
Film thickness was measured at 6.07 μm and demonstrated excellent uniformity.



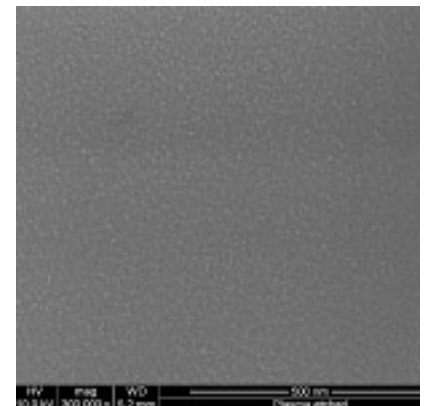
Cross section of deposited film



High magnification of the deposited film demonstrates zero voids

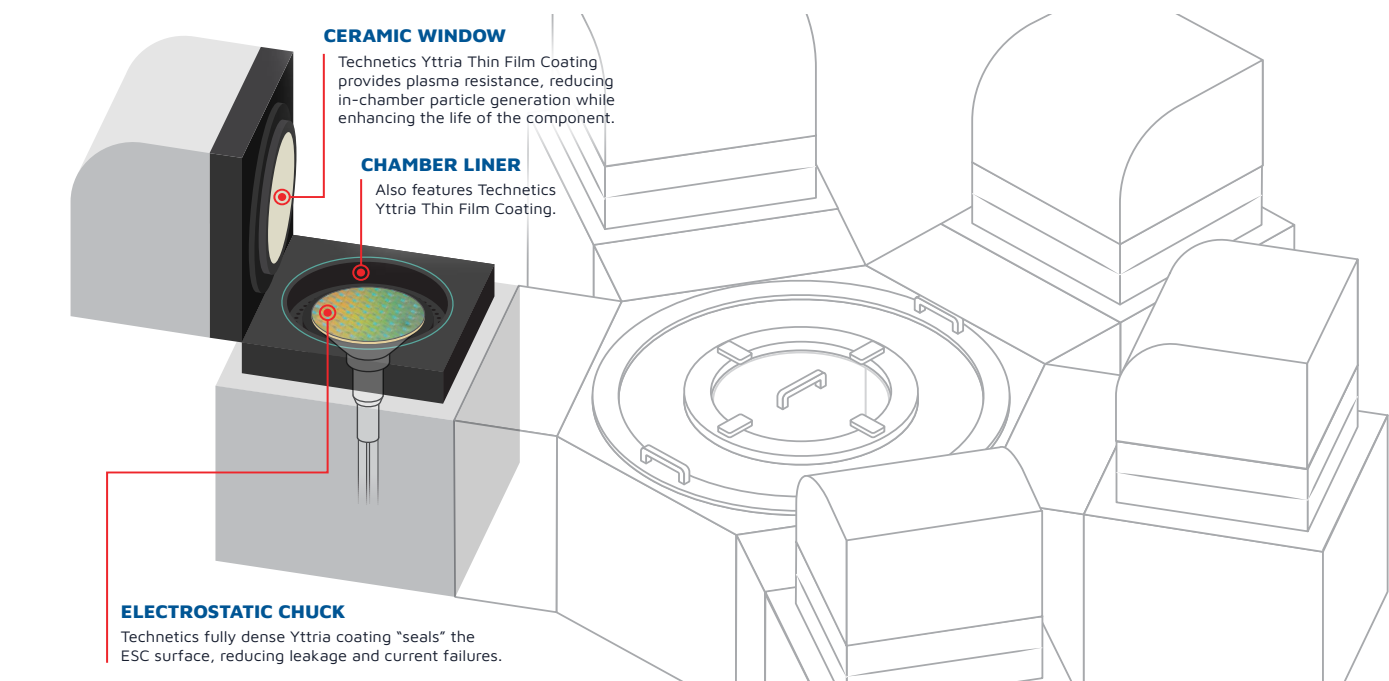


Pre-Etch



Post-Etch

Analytical work performed at an independent analytical service company. A final surface inspection was performed to determine surface roughness pre-and post-etch.

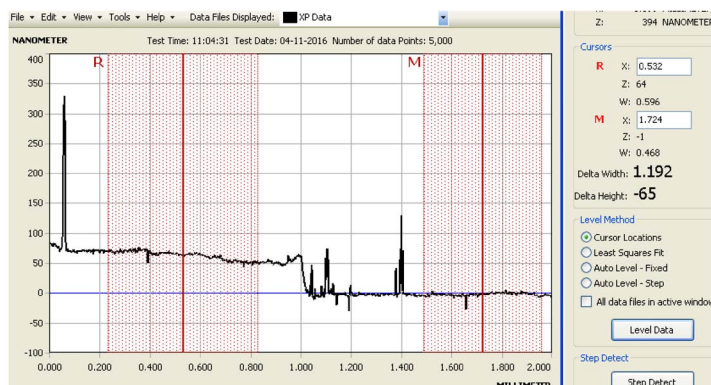


Initial etch testing

Etch testing was performed using an RIE system to determine initial etch resistance capability. Using a profilometer, an etch depth of about 60 nm was determined after a 30 min process in $\text{CF}_4 + \text{O}_2$ chemistry.

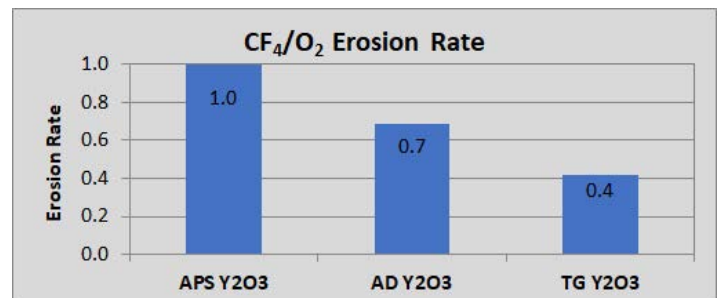
Results (Quartz Sample)

Etch depth measurement after RIE process (30 min) uniformity.



Test 2 was processed in a semiconductor facility

With CF_4 chemistry, the sample ran for a total of 8.7 hours and the etch rate was determined to be approximately 750 Angstroms.



APS - Atmospheric Plasma Spray
AD - Aerosol Deposition
TG - Technetics Group

The samples demonstrate superior etch resistance to aerosol deposition and other thin-film coatings. Additionally, the surface morphology changes are constant with low- etch and high-etch resistance, and the cross-sectional images indicate no porosity, providing a very dense film, which is consistent with the low-etch rate observed.