

RegenSi[®] 71

An efficient alternative for wafer reclaim/recycle methods

The RegenSi[®] family of products represent the efficient alternative to traditional test wafer recycle chemistries and are specifically formulated to provide process, cost and environmental benefits through a single-step process for removal of test metallization and advanced low- κ dielectric schemes. All RegenSi products are highly selective to silicon, resulting in rapid removal of desired deposits with virtually no damage to the underlying silicon layer. This minimizes — and in some cases eliminates — the need for expensive post-film strip processing such as CMP or silicon polish. This also dramatically extends the test life of each individual wafer. Better protection of the silicon surface, maximizes its number of potential test turns.

The RegenSi 71 formula is specifically designed to remove low- κ dielectric films, providing excellent recycle performance on low- κ test wafers down to $\kappa = 2.2$, a level not typically attainable using conventional HF chemicals. This solvent-free chemistry dissolves film rather than peel it off, is acceptable for use in-house and can be implemented on all major wet bench platforms to replace existing multi-process steps. This results in reduced wafer surface damage, process time, chemical usage, rinse water and waste volumes. Maximize your dielectric/low- κ test wafer life time by recycle/reclaim process with RegenSi 71.

FEATURES & BENEFITS

- One chemical process step for low- κ film removal ($\kappa = 3.0 - 2.2$)
- Elimination of the dry ash step
- Minimal silicon surface damage
- Increase recycle yield
- Increased uptime (fewer bath changes)
- Compatible with standard HF tank in a wet bench
- Removes most types of dielectrics
- Reduced costs for waste and energy

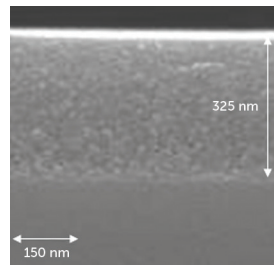
MATERIAL COMPATIBILITY

Testing has shown compatibility with the following materials of construction:

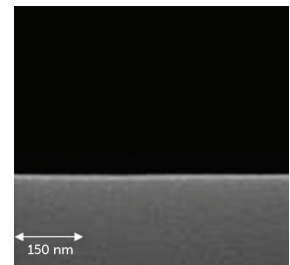
- High Density Polyethylene (HDPE), PFA, PVC, PVDF, Teflon[®] (PTFE), Halar and PP.
- RegenSi 71 is an acidic solution that can be used in any HF-compatible process and demonstrates high etch rates on all dielectric films tested.

PROCESS RECOMMENDATIONS

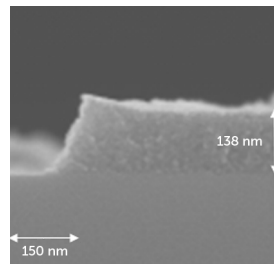
For RegenSi solution applications, customized recipes may be required depending on the system type (wet bench, single wafer etc.), but a spray tool is not recommended due to foam generation), the specific test wafers being processed and the customer specification requirements.



Si surface with dielectric film layer ready for removal.



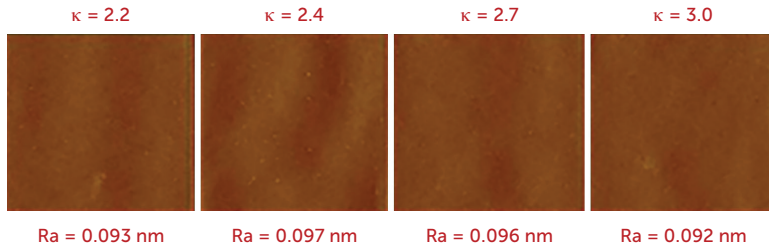
Si surface condition after RegenSi 71 one-step process showing complete removal with smooth surface.



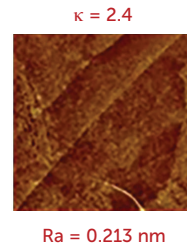
Si surface condition from a POR by commodity chemical showing incomplete removal results.

RegenSi 71 is a formulated chemistry designed to remove difficult-to-strip low- κ films, as well as the most commonly used dielectrics, through a one-step process. It saves time and money in wafer recycle and reclaim processes by extending the life of test wafers and by eliminating multiple process steps.

RegenSi 71

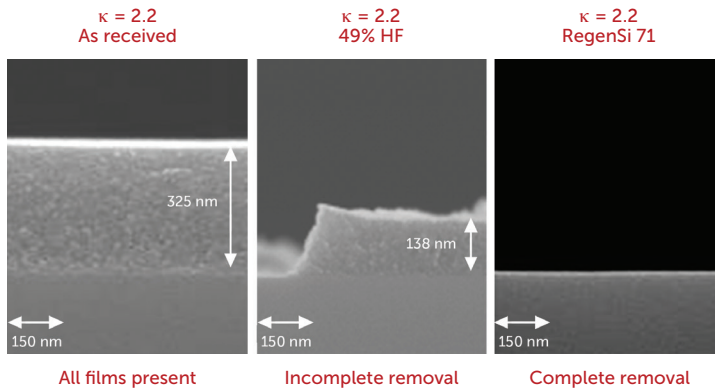


Plasma + dHF



Silicon surface roughness measurement results using "AFM" methodology.

Process Result Comparison



Effectively removing films in one step without damaging silicon is saving companies in the millions of dollars annually in energy savings and wafer, chemical, time and waste costs combined.

Commodity POR 49% HF	Film not completely removed Long process times
Plasma and dHF Process	Complex Expensive Surface Roughness
RegenSi 71 process	No low- κ residues remain Smooth surfaces for all κ values

SPECIFICATIONS

RegenSi 71 has the ability to remove the majority of commonly used dielectrics and advanced low- κ films. Additionally, wafers that are recycled with RegenSi 71 could be used as particle-grade monitors, or the same as new test wafers.

DETAIL	REGENSI 71
Contains solvents	No
Flashpoint	>100°C (212°F)
Viscosity (25°C [77°F])	2.712 cSt
Suggested process temperature	RT to 60°C (140°F)
Bath life	>48 hours
Low- κ loading	Very high
COD	250:1 dilution: <400 ppm
	500:1 dilution: <250 ppm
	1000:1 dilution: <150 ppm
All wet process solution	Yes
HVM use	Yes
Recycled wafers for particle monitors	Yes
Extend to porous low- κ material	Yes

FILM TYPE	ETCH RATE AT ROOM TEMP. (Å/MIN)*
Black Diamond I	>4200
Black Diamond II	>2600
FSG	>8000
TEOS	>6000
Th Oxide	>1500
Cu	1
Al	>10,000
AlCu	>6000
Ta	>250
Ti	>20,000
TiN	>10
TaN	>5
SiN (PECVD)	>500
SiN (LPCVD)	>50
SiCN	<1
W	<1
Poly	<1

*Etch rate mix ration is 2:1, RegenSi 71 and H₂O₂ (30%).

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