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XHRiC

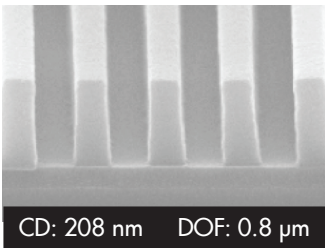
i-Line Anti-Reflective Coating

XHRiC coating provides optimal CD control for i-line applications with low topography (less than 350 nm).

BENEFITS

- Achieve optimum CD control by planarizing shallow topography for i-line LOCOS applications
- Increase flexibility in photoresist selection with broad resist compatibility
- Extend use life of i-line tools to sub-300-nm lithography

XHRiC Coating with TOK AR89 Resist



Resist thickness: 990 nm
PAB: 90°C for 90 s
PEB: 115°C for 90 s
BARC bake: 175°C for 60 s
Exposure Dose: 210 mJ/cm²

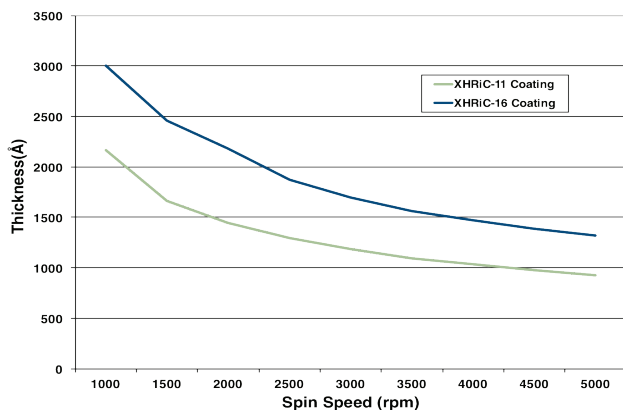
MATERIAL PROPERTIES

Typical Properties

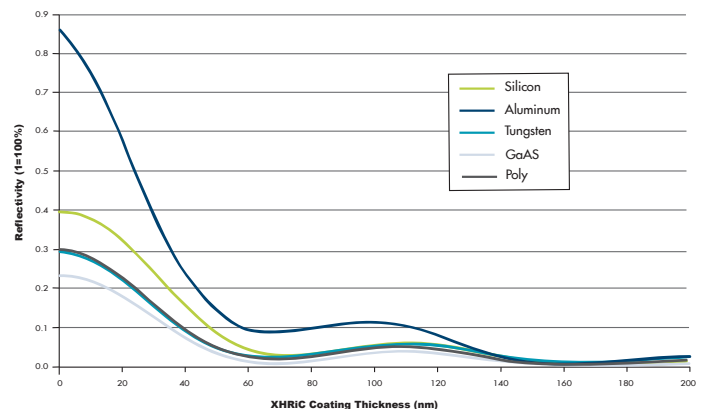
n at 365 nm	1.81
k at 365 nm	0.34
n at 633 nm	1.65
Cauchy A	1.618
Cauchy B	0.00908
Cauchy C	0.0029

Product-Specific Properties	XHRiC-11 Coating	XHRiC-16 Coating
Thickness at 3500 rpm, 175°C	1100 Å	1600 Å
Normalized Film Absorbance	0.59	0.85
Ions (Al, Cu, K)	<20 ppb	<25 ppb
Ions (Ca, Fe, Na)	<50 ppb	<50 ppb
Shelf Life at 21°C	12 months	12 months

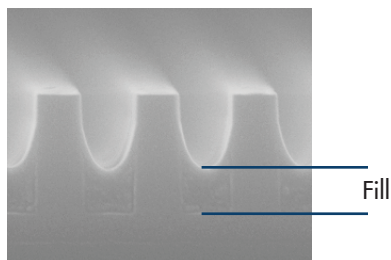
XHRiC Coating Spin Speed Curves



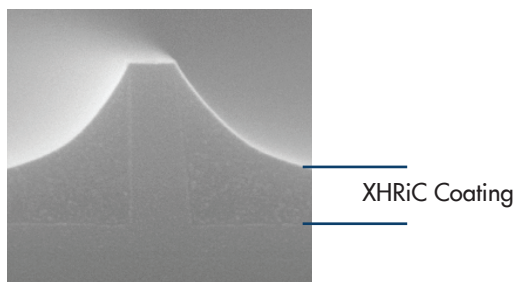
XHRiC Coating Reflectivity Curves



XHRiC-16 Coating on 1500-Å Step

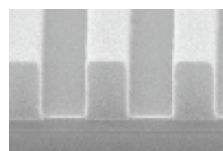
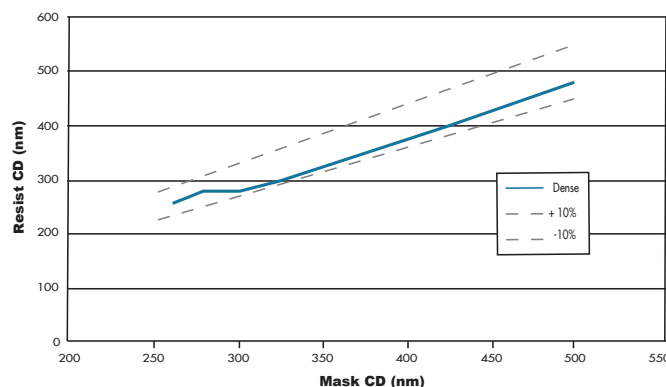


On Top: 8 nm
Fill: 158 nm

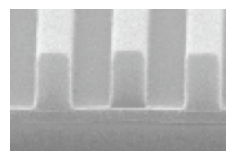


On Top: 13 nm
Fill: 103 nm

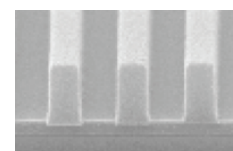
Linearity - XHRiC Coating with Fuji-Film OiR 674



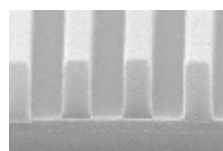
500 nm



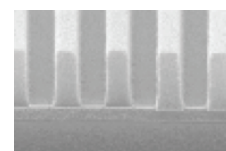
420 nm



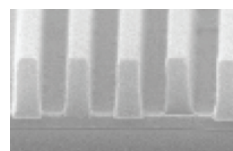
380 nm



340 nm



300 nm



280 nm

PROCESS RECOMMENDATIONS

Coat

XHRiC coating is applied by a spin-coating process. Apply with dynamic pump dispense* at 2600 to 2900 rpm and immediately ramp, without a spread pin, to 2000 to 5000 rpm for 30 seconds. Use standard edge bead remover (EBR) and backside process at 1500 rpm or less with a standard photoresist EBR solvent.

*Dispense speed optimization for specific equipment is required for thickness uniformity and defect reduction.

Bake

Single-stage hot plate bake at $175^{\circ}\text{C} \pm 20^{\circ}\text{C}$ for 60 seconds.

Resist Coat

Resist can be applied over XHRiC coating without any modification to the standard resist spin or baking process. An adhesion promoter is not recommended.

Exposure

In most applications, exposure dose may need to be increased from that of a stand-alone resist process by 20% to 50% due to the reduction in reflected light.

Resist Develop

Use a standard photoresist development process.

Dry Etching

XHRiC coating may be dry etched by a number of plasma etching methods including O_2 , $\text{O}_2/\text{CHF}_3/\text{Ar}$, C_2F_6 , Cl_2 , N_2/O_2 , O_2/HBr , and HCl .

Stripping

XHRiC coating can be removed by an oxidizing plasma or an oxidizing solvent stripping process such as ozone plasma stripping, Piranha cleaning, or RCA cleaning.

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