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ProTEK[®] PSB

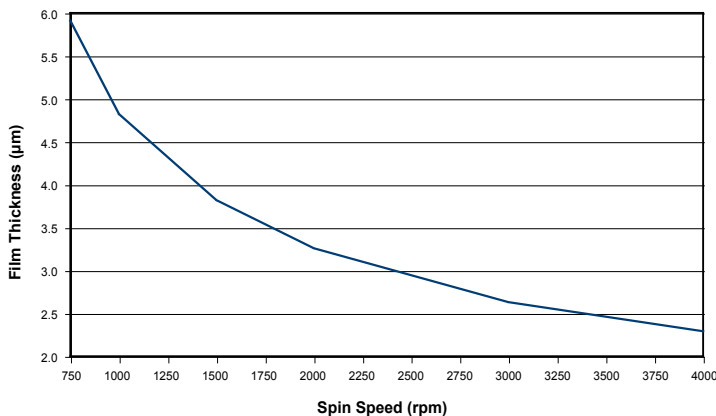
Photosensitive Alkaline-Protective Material

ProTEK[®] PSB material is a negative-working photosensitive alkaline etch mask that enables bulk silicon micromachining late in the process while preserving the metal stack.

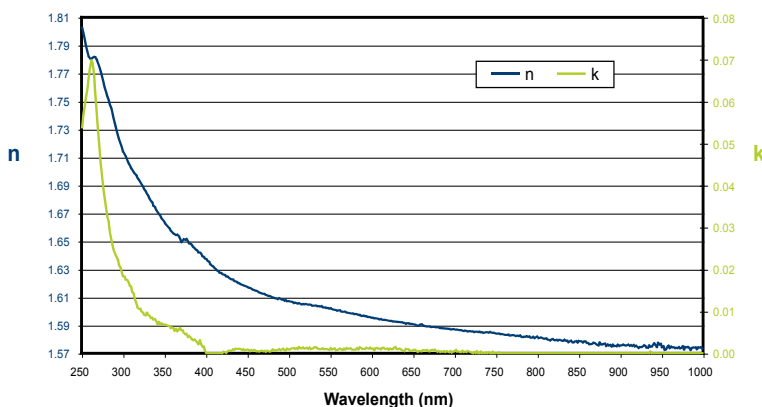
BENEFITS

- Apply over CMOS or MEMS structures at low process temperatures
- Reduce processing steps and time compared to SiN etch masks
- Provide higher throughput than single-wafer DRIE by using batch processing

ProTEK[®] PSB-23 Material Spin Speed Curve



ProTEK[®] PSB-23 Material n and k Spectra



PROCESSING STEPS

Wafer Pretreatment (RCA 1 and RCA 2 Cleaning)

First Bath: NH₄OH:H₂O₂:DI water (1:1:40) for 15 min at room temperature followed by DI rinse at room temperature for 5 min.

Second Bath: HCl:H₂O₂:DI water (1:1:40) for 15 min at room temperature followed by DI rinse at room temperature for 5 min. Spin-rinse dry or dry wafer in oven at 70°C for ~2 hours.

Process Parameters

ProTEK[®] PS Primer Material Coating Guidelines

Spin coat: 1000 rpm for 60 s

Acceleration: > 1000 to 10,000 rpm/s

First bake (hot plate): 110°C for 60 s

Second bake (hot plate): 220°C for 5 min

ProTEK[®] PSB-23 Material Coating Guidelines

Spin coat: 1000 to 2500 rpm for desired thickness

Acceleration: > 1000 to 10,000 rpm/s

First bake (hot plate): 110°C for 120 s

Exposure Guidelines (negative working)

Exposure dose: 500 mJ/cm² i-line or broadband

Post-exposure bake: 110°C for 120 s

Guidelines continue on next page

Post-Exposure Development Guidelines

Spin dispense or spray (ethyl lactate): 300 rpm for 10 s

Acceleration: 1000 rpm/s

Spin dry: 2000 rpm for 5 s

Acceleration: > 1000 to 10,000 rpm/s

Repeat above development steps 2 to 4 times, as necessary

Spin dispense or spray (DI water or IPA): 300 rpm for 8 s

Acceleration: 1000 rpm/s

Spin dry: 2000 rpm for 10 to 40 s, as needed

Acceleration: \geq 1000 to 10,000 rpm/s

Post-Development Guidelines

Bake (hot plate): 220°C for 180 s

Etch in TMAH or KOH per customer process requirements

For optimal undercut performance:

Recommended KOH bath temperature: ~ 75°C

Recommended TMAH bath temperature: ~ 90°C

Removal Guidelines

Recommended Dry Removal Process

1) Etch bulk film with O₂ plasma (75 sccm O₂, 400 W, 75 mTorr)

2) Etch with O₂:CF₄ (2:1), (56 sccm O₂, 19 sccm CF₄, 400 W, 100 mTorr)

Recommended Wet Removal Process

1) Immerse wafers coated with ProTEK® PSB material in Nano-Strip™ from Cyantek for 15 min at 100°C for rough clean.

2) Immerse wafers in clean bath of Nano-Strip™ from Cyantek for 15 min at 100°C for refined clean.

3) Rinse with DI water and dry.

Storage Conditions

ProTEK® PSB Material: Room temperature (16°C to 26°C)

ProTEK® PS Primer Material: Refrigerate (-5°C to 1°C)

Shelf Life

ProTEK® PSB Material: 365 days

ProTEK® PS Primer Material: 90 days

(When stored at above recommended conditions)

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Effective Date: 01/30/2020