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

**PROCESSING STEPS**

**Wafer Pretreatment (RCA 1 and RCA 2 Cleaning)**

*First Bath*: NH$_4$OH:H$_2$O$_2$:DI water (1:1:40) for 15 min at room temperature followed by DI rinse at room temperature for 5 min.

*Second Bath*: HCl:H$_2$O$_2$: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/cm$^2$ 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: ≥ 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)