AZ P4000

Thick Film Photoresist
DATA SHEET

Description
AZ P4000 photoresist is optimized for demanding thick resist requirements. It is ideal for applications requiring film thicknesses of 3 to 50 µm. This photoresist is production-proven for magnetoresistive (MR) and inductive thin film recording head coil plating, air bearing/slider fabrication, permanent insulation layers, tape automated bonding (TAB) water bumping processes, and many other mission-critical applications. Spin, spray, and roller coat versions are available to work with a wide variety of substrate shapes and sizes.

Surface Preparation
Surface preparation is a critical step for photoresist films. Substrates should be free of organic contamination and excessive physically adsorbed moisture.

Example of a Recommended Process (10 µm thickness)

<table>
<thead>
<tr>
<th>Step</th>
<th>Condition</th>
</tr>
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<tbody>
<tr>
<td>SOFTBake</td>
<td>110°C, 200 sec</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>400 ml/cm², Ultratech Stepper model 1500</td>
</tr>
<tr>
<td>POST-EXPOSURE</td>
<td>not necessary in most applications</td>
</tr>
<tr>
<td>BAKE</td>
<td>AZ 1400K developer 1:4</td>
</tr>
<tr>
<td>DEVELOPER</td>
<td>AZ 400K 200 sec spray</td>
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</table>

Optimum processing conditions are equipment and application specific.

Features
- Sleep wall profiles and excellent adhesion on a wide variety of substrates
- Sensitive to g, h, and i-line wavelengths
- Available in viscosities that allow coating thicknesses up to 50 µm
- Excellent ion-milling properties
- Exceptionally stable cured films

Benefits
- Ideal profile for up-plating
- Reduced rework
- No underplating even in thick films
- Fast photo speed on all popular exposure tools
- Single resist series that can be used in a wide range of applications
- High yields
- No cracking, peeling, or bubbling
- Provides an excellent, easy to use permanent insulator layer for critical high-reliability applications in thin film recording heads
- Toxicity hazard is extremely low
- Provides excellent coating properties

Spin Curve

Clariant
Companion Products

AZ-400K developer 1:4 and 421K developer are the recommended developers for thick films of AZ\(^*\) P4000 photoresist. These developers may be used for both spray and immersion development processes. AZ 400K is a buffered potassium-based developer that provides the process latitude associated with inorganic developers while minimizing risk associated with mobile ion contamination. AZ 421K is unbuffered. An alternative sodium-based developer, AZ\(^*\) Developer, has a very low salt rate on aluminum and can also be used with AZ P4000 photoresist. Developer bulletins with additional processing details are available.

Strippers

AZ\(^*\) 400T and 300T strippers are recommended for removal of AZ P4000 photoresist. AZ 400K developer concentrate can also be used for stripping when a corrosion-resistant substrate is used. Using this developer for stripping provides the added benefit of an all-aqueous (organic-solvent-free) system. Results in a quantitative reduction of organic residues as evidenced by the hydrophilic surface obtained after resist removal. Gold surfaces are an exception; they are not hydrophilic after stripping because they are hydrophobic by nature.

Edge Bead Removers

AZ\(^*\) EBR 70/30 and AZ\(^*\) EBR solvent are recommended for AZ P4000 photoresist for both front- and back-side edge bead removal.

Curing

AZ P4000 photoresist can be used as a permanent intermetal dielectric in devices such as thin film recording heads. The desired dielectric and mechanical properties can be achieved after pattern definition by thermal curing at temperatures above 200°C. Reactions taking place at this temperature involve resin crosslinking that results in chemical inertness and excellent mechanical properties of the cured resist patterns.

Solvent Safety

AZ P4000 photoresist is formulated with propylene glycol monomethyl ether acetate (PGMEA) as a solvent, which is preferred for use in photoresists by Clarion AG (U.S. patent number 4,550,059). PGMEA is among the best tested and safest photoresist solvents available.

Equipment Compatibility

AZ P4000 photoresist is compatible with all commercially available wafer and photomask processing equipment. Recommended materials of construction include stainless steel, glass, ceramic, PTFE, polypropylene, and high-density polyethylene.

Storage

Keep in sealed original containers away from oxidizers, sparks, and open flames. Protect from light and heat. Store in a cool, dry place. Empty container may contain harmful residue and vapors.

Handling Precautions/First Aid

Refer to the current Material Safety Data Sheet (MSDS) for detailed information prior to handling.