

Equipment Requirements

Storage

Three different options are required depending on the family of polyimides.

1. Durimide 32A and 200 series are room temperature stable and therefore do not require special care.
2. Durimide 100 series and LTP10-18A require storage in an explosion proof freezer capable of storing material between -15°C and -30°C .
3. Aqueous Buffer Coats (ABC) AP2210B, AN3310 as well as Durimide 7000, 7300 and 7500 series require an explosion proof freezer capable of storing material between -15°C and -30°C .

Clean Room

Normal clean room conditions with temperature controlled from 20°C to 24°C and relative humidity below 50% is suitable for all polyimides. For photosensitive polyimides the clean room should be equipped with amber yellow safety lights (550 nm cut off) over the polyimide coating area (wafer spin coater / hot plate track area), and normal yellow safety lights in the other processing areas.

Spin Coater

Preferably with a calibrated rpm control.

Spin Bowl

The spin bowl should be made of high density polyethylene, Teflon® or other material resistant to n-butyl acetate, cyclopentanone, γ -butyrolactone and N-methyl-2-pyrrolidone.

Dispensing System

The polyimide can be dispensed using a pressurized canister or high viscosity fluid pump. High viscosity fluid pumps (Teflon® membrane pumps) are available from various manufacturers including Mykrolis, IDI, and Tritac Corp. Pump dispense is recommended over pressurized dispense because of the high viscosity of the polyimide formulation and because this avoids saturating the polyimide with dissolved gas which can lead to bubble formation. Correct programming of two-stage pumps is essential to avoid bubble formation. Where photosensitive formulations are to be pressure dispensed, clean, dry air is essential to maximize the working shelf life and to maintain consistent performance. Nitrogen should not be used.

Do not leave the system pressurized when not in operation. The tubing used for the dispense should have an internal diameter (I.D.) of 1/8" to 1/4" (0.32 cm to 0.64 cm) and should be made of Teflon® or other compatible, non-leaching material. Where stainless steel is used, it should preferably be 316SS and properly passivated and cleaned. Where transparent or translucent tubing is used, shielding from yellow light should be effected by covering these lines with opaque material.

When equipment is idle for several days, the material should be removed and the lines, valves, (and pump) should be cleaned with NMP or polyimide developer. We recommend that tubing be replaced before start-up since replacement usually involves lower costs than cleaning.

Softbake Unit

Hot plate units (2-4 units) with good temperature uniformity at 70°C-110°C ($\pm 1^\circ\text{C}$) are recommended features for the wafer track system. One can increase the throughput by adding more hot plates or using a 2-step process using a hot plate in conjunction with forced air oven bake. See process instructions for details. For the oven bake step, we recommend using clean room convection ovens (capable of 70-150°C) with good ventilation, and good temperature uniformity: $\pm 2^\circ\text{C}$ at 100-150°C. Soft bake should be done in air. The substrates must be positioned horizontally and leveled during softbake.

Exposure Tool

Durimide photosensitive polyimides are sensitive to UV radiation in the 350-450 nm range and can be exposed with common high pressure mercury lamps (contact / proximity / scanning projection / step-and-repeat projection: i-line, g-line, broadband).

Development Unit

A spray developer system with atomizing spray nozzles is recommended to obtain optimum resolution. Alternatively, a standard spray/puddle developer can be used.

Curing Oven

A well vented curing oven capable of 400°C and equipped with a nitrogen purge is necessary. The system must be able to maintain the oxygen concentration below 50 ppm at temperatures above 250°C.

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