PMMA and Copolymer Developer

Description

Kayaku Advanced Materials' wide range of MIBK:IPA developer and rinse formulations are designed for high resolution, high throughput PMMA and copolymer resist processing. These developers are available in 4 liter packaging.

Benefits

- Optimized for PMMA and copolymer resists
- Wide range of standard formulations
- Compatible with spray and immersion processes
- Sub 0.1 µm resolution

The Exposure and Development Mechanism

PMMA (polymethyl methacrylate) is a high resolution, high contrast, positive tone resist designed for e-beam and x-ray lithographic processes. Images are formed through the photo-scission of the polymer backbone, which reduces the molecular weight and increases the develop selectivity.

Kayaku Advanced Materials' developer formulations are blends of MIBK and IPA. MIBK is the solvent and active ingredient, which controls the solubility and swelling of the resist, while IPA is the alcohol (non-solvent). PMMA is most commonly developed using MIBK:IPA in the following ratios: 1:1, 1:2 or 1:3. Formulations containing higher amounts of solvent (MIBK) are more aggressive and offer higher throughput, while formulations containing higher amounts of non-solvent (IPA) are less aggressive and designed for higher resolution applications.

PRODUCT	COMPOSITION	RESOLUTION	SENSITIVITY/ THROUGHPUT
M/1 1:1	1:1 MIBK to IPA	high	high
M/1 1:2	1:2 MIBK to IPA	higher	medium
M/1 1:3	1:3 MIBK to IPA	very high	low
MIBK	MIBK	low	very high

Table 1. Available Blends of PMMA and Copolymer Developer

ACTION	SPRAY**	SPRAY PUDDLE**	IMMERSION (21°C)
Dispense	500 rpm for 30-45 seconds	500 rpm for 3-4 seconds	30 seconds
Dispense	n/a	0 rpm for 2 seconds	n/a
No Dispense	n/a	0 rpm for 25-40 seconds	n/a
Rinse*	500 rpm for 30-45 seconds	500 rpm for 30-45 seconds	30 seconds
Dry	500 rpm for 30 seconds	5000 rpm for 30 seconds	Nitrogen blow dry

* Recommended rinse solution is MIBK to IPA 1:3 in order to reduce the possibility of scumming
** Variables such as developer pressure, nozzle type & position, spray pattern, etc. should be optimized

Table 2. Typical Development Process

www.kayakuAM.com
sales@kayakuAM.com
617-965-5511

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Material and Equipment Compatibility

PMMA and Copolymer Developer is compatible with glass, ceramic, high-density polyethylene, PTFE (TEFLON), polypropylene, stainless steel, and equivalent materials. MIBK, the primary ingredient, will attack various elastomers such as VITON A, NEOPRENE, and BUNA A over time. It will also attack PVC, CPVC and PVDF. PTFE (TEFLON) or EPDM is recommended for both O-rings and tubing.

Storage

Store upright in original sealed containers in a dry area between 4°C and 27°C (40-80°F). Keep away from sources of ignition, light, heat, oxidants, acids and reducers. Do not use product after the expiration date (13 months from date of manufacture).

Disposal

The material and its container must be disposed in accordance with all local, state, federal and/or international regulations.

Handling

Consult Safety Data Sheet (SDS) for details on the handling procedures and product hazards prior to use. If you have any questions regarding handling precautions or product hazards, please email *productsafety@kayakuAM.com*.

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