SHIPLEY

MICROPOSIT® 351 DEVELOPER

MICROPOSIT 351 DEVELOPER is an aqueous alkaline solution for commercially available positive resists such as 1300 and specifically formulated for use with MICROPOSIT S1400® and S1800® SERIES PHOTO RESIST systems. It has been optimized for wafer fabrication and other micro-electronic applications for which high speed and resolution are required.

Automation

- Immersion
- Inline track
- Batch spray

High Process Reliability

- Tight product specifications
- Stringent quality control
- Complete systems functional testing

Excellent Resolution

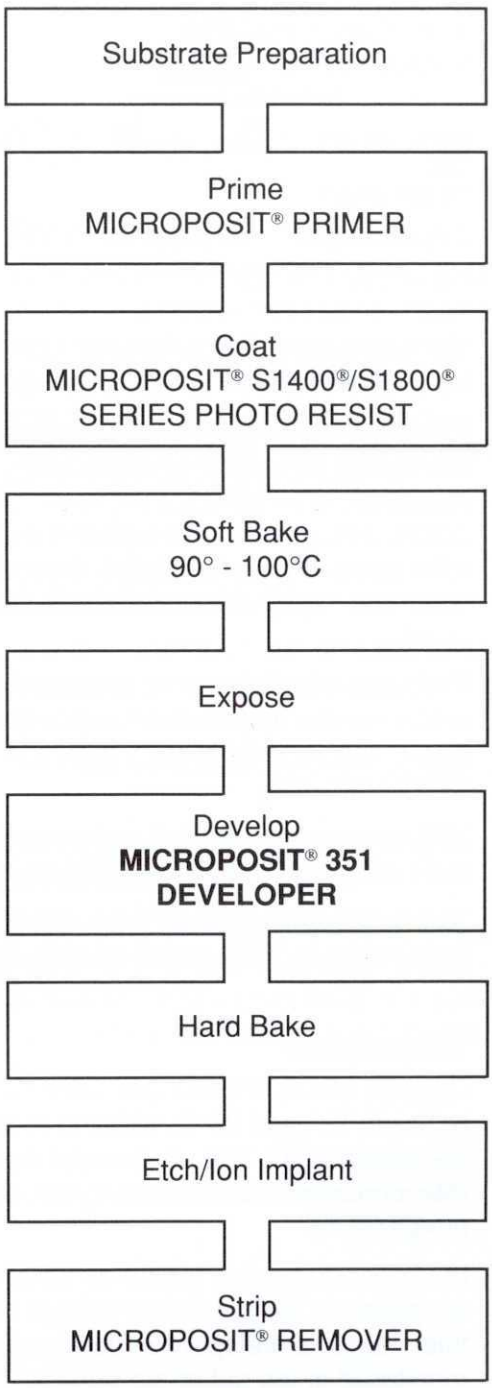
- High differential solubility
- Excellent development tolerance
- No swelling of photoresist

High Inspection Yields

- Clean, residue-free development
- Wide process latitude

Cost Efficient

- Excellent exposure throughput



MDD-351 E
0491

2. Add approximately 100 mls deionized water.
3. Add 3 to 5 drops methyl red indicator.
4. Titrate with 0.1 N HCl from yellow to red color change.

C. Calculations

$$\frac{\text{ml HCl titrated} \times \text{N HCl}}{\text{5 mls}} = \text{Normality of MICROPOSIT 351 DEVELOPER}$$

D. Results

The normality of freshly made-up MICROPOSIT 351 DEVELOPER should be:

1:3½ make-up	0.31 ±0.02 N
1:5 make-up	0.23 ±0.02 N

Equipment

Use polypropylene, polyethylene, polytetrafluoroethylene, or equivalent materials.

Storage

Store MICROPOSIT 351 DEVELOPER only in upright, original containers in a dry area at 50°-90°F. Store away from acids. Do not store in sunlight. Store away from heat and sources of ignition. Keep container sealed when not in use.

Waste Treatment

A used bath may be treated according to Shipley Waste Treatment Procedure WT 77-1. Contact your Shipley Technical Representative for more information. It is your responsibility to verify that this procedure complies with federal, state and local laws and regulations for wastewater discharge.

Due to the nature of MICROPOSIT 351 DEVELOPER, disposal of it, or residues therefrom, should be made in compliance with federal, state and local environmental laws.

Properties As Delivered

MICROPOSIT 351 DEVELOPER is manufactured to the highest quality standards and is subjected to state of the art testing for physical, chemical and functional properties to assure the user of maximum lot to lot reproducibility.

MICROPOSIT 351 DEVELOPER is filtered to 0.2µm absolute directly into clean containers.

Certificates of Analysis will be supplied with each shipment upon request. Quality Assurance Material Specifications and Analytical Testing Procedures may be obtained upon request from your Shipley Technical Sales Representative.

MICROPOSIT 351 DEVELOPER, as delivered, will conform to the following specifications:

Specific gravity at 20/20°C	1.073–1.093
Color	Water white to very pale yellow solution
Turbidity	Nonturbid
Total Alkaline Normality	1.36–1.42

Handling Precautions

DANGER! MICROPOSIT 351 DEVELOPER is an alkaline corrosive liquid containing sodium hydroxide. Contact with eyes, skin and mucous membranes causes irritation and burns. Handle with care. Do not get in eyes, on skin or on clothing. Avoid breathing vapors or mists. Use with adequate ventilation. Wash thoroughly after handling.

Wear chemical goggles, chemical gloves and suitable protective clothing when handling MICROPOSIT 351 DEVELOPER.

In case of eye or skin contact, flush affected areas with plenty of water for at least 15 minutes. Then contact a physician at once.

Consult product Material Safety Data Sheet before using.

FLUSH EMPTY CONTAINERS THOROUGHLY WITH WATER BEFORE DISCARDING.

CAUTION! When using immersion heaters, failure to maintain proper volume level can expose tank and solution to excessive heat, resulting in a possible combustion hazard, particularly when plastic tanks are used.

MICROPOSIT® 351 DEVELOPER

Instructions For Use

I. Bath Make-up

Dilute MICROPOSIT 351 DEVELOPER for use as follows:

	High Speed Make-up (22% solution)	High Resolution Make-up (17% solution)
MICROPOSIT 351 DEVELOPER	1 part by volume	1 part by volume
Deionized water	3½ parts by volume	5 parts by volume

Mix thoroughly. Proper dilution can be verified by analysis for normality. See section VII.

Photoresist dissolution rate increases with increasing developer concentration. Maximum resolution is obtained at the lower developer concentration where unexposed resist loss is minimized. Shorter exposure times are possible when the higher developer concentration is used.

Production line downtime and potential dilution errors can be avoided with ready to use developers (MICROPOSIT 352, 353, 354, 355 DEVELOPERS).

352 is recommended for high resolution (equivalent to 1:5 make-up above).

354 is recommended for high speed (equivalent to 1:3½ make-up above).

II. Temperature

Operate MICROPOSIT 351 DEVELOPER between 20° and 25°C, with the temperature controlled ±1°C. The photoresist dissolution rate increases with increasing developer temperature.

In spray equipment, the spray action causes a temperature drop in the developer solution. For this reason, developer temperature should be monitored at the substrate surface.

III. Time

Immersion: 40-60 seconds.

Spin/spray: Varies with equipment. Consult your Shipley Technical Sales Representative.

Longer development times permit the use of shorter exposure times. Shorter development times minimize developer attack on the unexposed photoresist. The range recommended is optimum. We recommend keeping the development time constant and adjusting the exposure time as necessary to meet critical dimension requirements.

IV. Agitation

Immersion: Mild, consistent agitation is recommended.

Spin/spray: Contact your Shipley Technical Sales Representative.

V. Rinse

Immersion: Cascade rinse with deionized water to resistivity specification immediately after developing.

Spin/spray: Overlap deionized water rinse with developer cycle to prevent developer drying on substrate surface. Provide adequate rinsing of back side of substrates.

VI. Bath Control

Immersion: For maximum process control, replace bath with fresh developer solution at least once per shift. Keep bath covered when not in use.

Spin/spray: Not applicable.

Batch spray: As recommended by equipment manufacturer.

VII. Determination of Total Alkaline Normality

A. Reagents
   1. Hydrochloric acid (HCl), 0.1 N, standardized
   2. Methyl red indicator solution

B. Procedure
   1. Pipette 5 mls aliquot MICROPOSIT 351 DEVELOPER bath into a 250 ml Erlenmeyer flask.

Worldwide Operations
Shipley Company
455 Forest Street
Marlborough, MA 01752-3001
TEL: (508) 481-7950
FAX: (508) 485-9113

European Operations
Shipley Europe Ltd.
Herald Way
Coventry CV3 2RQ
United Kingdom
TELEX: 851 311316
TEL: 441 203 457 203

Far East Operations
Shipley Far East Ltd.
Nishidai-NC Bldg.
1-83-1, Takashimadaira
Itabashi-ku, Tokyo 175
Japan
TELEX: 781 28875
TEL: 81 35 920 5300

Domestic Sales Offices

Marlborough, MA
(508) 481-7950
(800) 832-6200

Carrollton, TX
(214) 446-2400
(800) 527-3730

Tempe, AZ
(602) 894-5499
(800) 262-6377

Santa Clara, CA
(408) 988-3600
(800) 423-9937

International Sales Offices

Evry, France
33 1 60 86 81 82

Milano, Italy
39 2 938 1586

Geldrop, The Netherlands
31 40 853 335

Norrkoeping, Sweden
46 11 108170

Jona, Switzerland
41 55 284 646/647

Esslingen, Germany
49 711 - 931 32-0

Kowloon, Hong Kong
852 6 940661

Singapore
65-862-1888

International Distributors

Australia, China, India, Israel, Mexico, Singapore, South Africa, South Korea, Spain, Taiwan, Western Canada.

Manufacturing Locations

Marlborough, MA; Coventry, United Kingdom; Sasagami, Japan.

SHIPLEY®