



**HD Microsystems™**

An Enterprise of Hitachi Chemical and DuPont Electronics

## MATERIAL SAFETY DATA SHEET

### \*\*\*\*\* IDENTIFICATION \*\*\*\*\*

NAME: PI2771

SYNONYMS: POLYIMIDE COATING, PD7

CHEM.FAMILY: Pyralin ®Polyimide Coating      FORMULA: Proprietary.

#### MANUFACTURER:

HD Microsystems  
Cheesequake Rd.  
Parlin, NJ 08859

#### INFORMATION & EMERGENCY TELEPHONE NOS:

INFORMATION: Product: (800)441-7515  
EMERGENCIES: Medical: (800)441-3637  
in Canada: (613)348-3616  
Transportation (CHEMTREC): (800)424-9300

### \*\*\*\*\* PHYSICAL DATA \*\*\*\*\*

FORM: Viscous Liquid.

ODOR: Sweet Aromatic.

APPEARANCE: Brown

SOLUBILITY IN WATER: Slight.

### \*\*\*\*\* COMPONENTS \*\*\*\*\*

Material(s):	CAS#	V.P. mm Hg @ 20C	Weight %
N-Methyl-2-Pyrrolidone.	872-50-4	< 1.	30 - 60%
Tetraethylene Glycol Discrylate.	17831-71-9	< 0.001	5 - 10%
Photosensitive Polyimide Resin.			30 - 60%
Proprietary Ingredient(s)			1 - 5 %

### \*\*\*\*\* HAZARDOUS REACTIVITY \*\*\*\*\*

#### INSTABILITY:

The product is normally stable.

**INCOMPATIBILITY:**

Avoid contact with:

Acids; Bases; Oxidizing agents; Free radical initiators.

**DECOMPOSITION:**

Decomposition products at high temperature may include:

Carbon monoxide, carbon dioxide, water; Nitrogen oxides; Sulfur oxides;  
Alcohols; Silicon oxides

**POLYMERIZATION:**

The product does not normally polymerize significantly.

**\*\*\*\*\* FIRE & EXPLOSION DATA \*\*\*\*\***

**FLASHPOINT:** 201F Calculated.

**FIRE & EXPLOSION HAZARDS:**

The product is not an unusual fire or explosion hazard.

**EXTINGUISHING MEDIA:**

Water spray, dry chemical or carbon dioxide.

**SPECIAL FIREFIGHTING INFORMATION:**

Toxic decomposition products may form under fire conditions. (See Decomposition Section.); Wear full protective clothing and a full facepiece, positive pressure, self-contained breathing apparatus (SCBA); Decontaminate contaminated clothing and equipment with soap and water. Dispose of residues per federal, state, and local regulation. (See Waste Disposal Section.).

**\*\*\*\*\* HEALTH HAZARD INFORMATION \*\*\*\*\***

**OVERVIEW:**

The most likely routes of overexposure to this product are skin contact and inhalation. Skin irritation and/or other effects of skin contact are easily avoided by using proper gloves (see section titled GLOVES) and washing affected areas immediately if contact occurs. Volatile solvents will start evaporating during room temperature use of the product, such as thinning, pouring from jar to dispensing machine, and spin coating. Mist and solvent vapors will evolve if spray application is used. During wafer drying, 125 - 150 C, and final curing, 350 - 450 C, the remaining solvent(s) will evaporate. Potential overexposure to other chemicals

used in the operation such as wafer etchants and cleaners should also be considered. Well designed area and personal air sampling and analysis can show if exposures are within established limits. Properly designed local ventilation and process enclosure are effective ways to limit employee exposure where needed. In addition to meeting exposure limits, it is always prudent to use all practical means to minimize employee exposure to chemicals. A significant difference in overall exposure can be made with practical measures such as:

- \* Inhalation - minimizing by keeping jars of product covered
- \* Eye - avoiding contact by wearing chemical splash goggles where there is splash potential
- \* Ingestion - avoiding by washing hands before eating, drinking or smoking, and restricting these activities to outside the work area.

#### PRINCIPAL HEALTH EFFECTS:

##### >>>N-Methyl-2-Pyrrolidone

Toxic effects described in animals include: By skin or eye contact: Moderate eye irritation; Mild skin irritation; No skin sensitization; By inhalation: Respiration rate changes; Blood system effects; Weight loss; Salivation. Toxic effects of repeated or prolonged animal exposures include: By inhalation: Lethargy/inactivity; Respiration rate changes; Thymus effects; Bone marrow effects; Spleen effects; Lymph system effects; Death; By ingestion: Enzyme effects; Blood effects; Body chemistry effects; Thyroid effects; Toxic effects of chronic animal tests include: By inhalation: Reduced weight gain; Additional animal tests have shown: No carcinogenic activity; No developmental toxicity; No reproductive toxicity; No genetic damage in bacterial or mammalian cell cultures. Human health effects of overexposure may include: By contact with liquid or vapor: Eye irritation with discomfort, tearing, or blurring of vision; By skin or eye contact: Skin irritation with discomfort or rash; By inhalation: Irritation of the upper respiratory passages with coughing and discomfort. Human effects of higher level acute, repeated, or chronic overexposure may include: By skin or eye contact: Dermatitis. In addition: There are inconclusive or unverified reports of human sensitization.

##### >>>Tetraethylene Glycol Diacrylate

Toxic effects described in animals include: By skin or eye contact: Skin sensitization; Moderate skin irritation; Corrosive to the eye. Toxic effects of repeated or prolonged animal exposures include: By skin or eye contact: Corrosive to the skin; Toxic effects of chronic animal tests include: By skin or eye contact: Corrosive to the skin; Additional animal tests have shown: Carcinogenic toxicity; No genetic damage in bacterial cell cultures; Genetic damage in mammation cell cultures; No developmental toxicity. Human health effects of overexposure may include: By skin or eye contact: Skin irritation with discomfort or rash; Allergic skin rashes; Eye irritation with discomfort, tearing or blurring of vision. Human effects of higher level acute, repeated, or chronic overexposure

may include: By skin or eye contact: Skin burns or ulceration; Eye corrosion with corneal or conjunctival ulceration. In addition: Skin sensitization may be caused in susceptible humans; The chemical is a weak carcinogen on the skin of mice.

>>>Photosensitive Polyimide Resin

>>>Proprietary Ingredient(s)

Toxic effects described in animals include: Skin irritation; Eye irritation; Upper respiratory irritation.

>>>Proprietary Ingredient(s)

>>>Proprietary Ingredient(s)

Toxic effects described in animals include: By skin or eye contact: Mild skin irritation; Mild eye irritation; No skin sensitization; By inhalation: Upper respiratory irritation. Additional animal tests have shown: No mutagenic toxicity.

>>>Proprietary Ingredient(s)

Toxic effects described in animals include: Skin irritation; Eye irritation.

>>>Proprietary Ingredient(s)

ANIMAL DATA:

>>>N-Methyl-2-Pyrrolidone

Inhalation 4 hour ALC: 1.7 mg/L in rats

Skin absorption LD50: > 8,000 mg/kg in rabbits

Oral LD50: 4,320 mg/kg in rats.

>>>Tetraethylene Glycol Diacrylate

Skin absorption LD50: > 3,000 mg/kg in rabbits

Oral LD50: 813.2 mg/kg in rats.

CARCINOGENICITY LISTING:

No ingredients of this product are designated by IARC, NTP, OSHA, ACGIH or Dupont as potential carcinogens.

**EXPOSURE LIMITS:**

Workplace exposures should be kept below the following limits:

Name/Units	AIHA		ACGIH		OSHA	
	8hr	15min	8hr	15min	8hr	15min
N-METHYL-2-PYRROLIDONE						
Units: ppm	10					
TETRAEHTYLENE GLYCOL DIACRYLATE						
Units: mg/m <sup>3</sup>	1					
PARTICULATES (N.O.S.), total						
Units: mg/m <sup>3</sup>			10		15	
PARTICULATES (N.O.S.), respirable						
Units: mg/m <sup>3</sup>					5	

Also, DuPont has established and observes the following limits:

Name/Units	12 hr	8hr	15min Ceiling
N-METHYL-2-PYRROLIDONE			
Units: ppm		25	
TETRAEHTYLENE GLYCOL DIACRYLATE			
Units: mg/m <sup>3</sup>	0.5	0.5	

**NOTES ON EXPOSURE LIMITS:**

OSHA Permissible Exposure Limits (PELs) are included in 29 CFR1910.1000, Subpart Z, or specific substance standards;

ACGIH Threshold Limit Values (TLVs) are published by the American Conference of Governmental Industrial Hygienists, 6500 Glenway Ave., Cincinnati, OH 45211;

AIHA Workplace Environmental Exposure Levels (WEELs) are published by the American Industrial Hygiene Assoc., 475 Wolf Ledges Pkwy., Akron, OH 44311;

C (ceiling) indicates a limit not to go above for any time period;

S (skin) indicates skin absorption may contribute significantly to the internal toxicity of the ingredient.

**\*\*\*\*\* FIRST AID INSTRUCTIONS \*\*\*\*\***

**Skin Contact:** For skin contact, immediately wash skin with soap and water. Wash contaminated clothing before reuse.

**Eye Contact:** For eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**Ingestion:** If swallowed, do not induce vomiting. Immediately give two glasses of water. Never give anything by mouth to an unconscious person. Call a physician.

NOTES TO PHYSICIAN: Activated charcoal slurry may be administered. To prepare activated charcoal slurry, suspend 50 grams activated charcoal in 400ml water and mix thoroughly. Administer 5ml/kg, or 350ml for an average adult.

\*\*\*\*\* PROTECTION INFORMATION \*\*\*\*\*

Respiratory Protection:

Selection of a suitable respirator will depend on the properties of the contaminant(s) and their actual or expected air concentration(s) versus applicable limits. Consult ANSI Standard Z88.2 for decision logic to select appropriate NIOSH/MESA approved respirators; If respirators are needed to meet applicable limits, a respiratory protection program up to the level of OSHA Standard 29 CFR 1910.134 is mandatory. This includes air monitoring, selection, medical approval, training, fit testing, inspection, maintenance, cleaning, storage, etc.

Gloves:

Gloves should be used when the possibility of skin contact exists; The suitability of a particular glove and glove material should be determined as part of an overall glove program. Considerations may include chemical breakthrough time; permeation rate; abrasion, cut and puncture resistance; flexibility; duration of contact; etc.

Other Protection Practices:

Appropriate eye protection such as chemical splash goggles should be used if the possibility of eye contact exists; Protective outer clothing should be used where the possibility of body contact exists. Contaminated work clothing should not be allowed out of the workplace; Do not smoke, consume or store food or drinks in areas where the product is handled or stored. After handling the product, wash hands thoroughly before leaving the work area; Additional engineering controls, work practices and training may be required depending on exposure levels. These are discussed in the OSHA Respiratory Protection Standard (29 CFR 1910.134) and OSHA Hazard Communication Standard (29 CFR 1910.1200);

\*\*\*\*\* DISPOSAL INFORMATION \*\*\*\*\*

Spill, Leak or Release:

FOR SMALL SPILLS, absorb on rags, sand or other absorbent material; FOR LARGE SPILLS, get workers out of affected area. If flammable liquids or vapors may be present, turn off electrical devices or other sources of sparks or flames. WEAR PROTECTIVE EQUIPMENT. Use supplied-air respiratory protection if vapor concentrations are not known; Contain spill at source by diking or absorbing with sand. Do not allow spill to spread to or intentionally flush to sewer or ground.

Wash area thoroughly. Adequately ventilate area; Spill residue, cleaning rags and absorbent may be considered hazardous. (See Waste Disposal Section.).

**Waste Disposal:**

Components of this product may be considered hazardous; Consult applicable Federal, State, and local regulations for allowable disposal methods.

**\*\*\*\*\* PRODUCT INFORMATION \*\*\*\*\***

Contains photoreactive chemicals. Open and use under yellow light.

**Contaminated Items:**

Empty product containers, contaminated clothing and cleaning materials, etc. should be considered hazardous until decontaminated or properly disposed of. (See Waste Disposal Section.).

**Storage:**

Store product in a refrigerated location (0-4F), away from sunlight or ultraviolet light to ensure product viscosity stability.

**\*\*\*\*\* ADDITIONAL INFORMATION \*\*\*\*\***

No ingredients of this product are subject to the reporting requirements of section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR part 372.

This product is a physical mixture. The health effects information about this product is based on the individual ingredients; The data in this Material Safety Data Sheet relates only to the specific product designated herein and does not relate to its use in combination with any other material or in any process.

Date of latest MSDS revision: 05/24/96

**Person Responsible for MSDS:**

Christina N. Lazaridis  
Research Associate  
HD MicroSystems  
DuPont Experimental Station  
Wilmington, DE 19880-0334  
(302) 695-2386