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Material Safety Data Sheet

HD MicroSystems™

HD 4110

Version 2.1

Revision Date 02/06/2013 Ref. 130000030676

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : HD 4110
MSDS Number : 130000030676

Product Use : Polyimide coating for semi-conductor industry

Manufacturer : HD MicroSystems™
250 Cheesequake Road
Parlin, New Jersey 08859

Product Information : 800-346-5656
Transport Emergency : CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Potential Health Effects

Skin : May cause skin irritation.

Eyes : Contact with eyes may cause irritation.

Inhalation : Altered respiratory rate May cause irritation of respiratory tract.

Ingestion : Effects due to ingestion may include: Kidney effects, Respiratory irritation, Liver effects, Central nervous system.

Repeated exposure : The material may be absorbed through the skin.

Target Organ : Respiratory system, Kidney, Liver, Nervous system

Carcinogenicity
None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen.

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SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
N-Methyl-2-pyrrolidone	872-50-4	40 - 50 %
Polyamic Acid Ester		30 - 40 %
3,6,9-Trioxaundecamethylene dimethacrylate	109-17-1	1 - 10 %
Aromatic Oxime		1 - 10 %
Methanol	67-56-1	<5 %
Adhesion Promoter		1 - 10 %

SECTION 4. FIRST AID MEASURES

Skin contact : Wash off with soap and water. Get medical attention if irritation develops and persists. Wash contaminated clothing before re-use.

Eye contact : Immediately flush eyes for at least 15 minutes. Get medical attention.

Inhalation : If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion : If swallowed Rinse mouth with water. Call a physician or poison control centre immediately. DO NOT induce vomiting unless directed to do so by a physician or poison control center.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties
Flash point : 93 °C (199 °F)

Fire and Explosion Hazard : Hazardous decomposition products formed under fire conditions. (see also section 10) Avoid breathing decomposition products.

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Water spray, Carbon dioxide (CO2), Dry chemical, Foam

Firefighting Instructions : Wear self-contained breathing apparatus and protective suit.
Evacuate personnel to safe areas. Stop spill/release if it can be done with minimal risk. Do not allow run-off from fire fighting to enter drains or water courses.

SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Safeguards (Personnel) : Avoid contact with skin, eyes and clothing. Ensure adequate ventilation. Wear suitable protective equipment.

Spill Cleanup : Contain spill. Soak up with inert absorbent material. Collect and contain contaminated absorbent and dike material for disposal. Keep in suitable, closed containers for disposal. Ventilate the area. Clean contaminated surface thoroughly.

Accidental Release Measures : Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. Clean contaminated floors and objects thoroughly while observing environmental regulations.
Dispose of in accordance with local regulations.

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SECTION 7. HANDLING AND STORAGE

Handling (Personnel) : Avoid inhalation, ingestion and contact with skin and eyes. Do not use in areas without adequate ventilation. Keep container closed when not in use. Take care to avoid waste and spillage when weighing, loading and mixing the product.
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Contaminated work clothing should not be allowed out of the workplace. Remove contaminated clothing and protective equipment before entering eating areas. Remove and wash contaminated clothing before re-use.

Handling (Physical Aspects) : Avoid formation of dust and aerosols. Keep away from heat and sources of ignition.

Storage : Store in original container. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from sources of ignition - No smoking. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material. Keep container closed when not in use. Do not reuse emply container.

Storage temperature : 20 - 30 °C (68 - 86 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls : Local exhaust or a laboratory hood should be used when handling the materials. Maintain air concentrations below occupational exposure standards.

Personal protective equipment
Respiratory protection : Provide adequate ventilation. No personal respiratory protective equipment normally required. Where there is potential for airborne exposures in excess of applicable limits, wear approved respiratory protection with dust/mist cartridge. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by the manufacturer.

Hand protection : Material: Solvent-resistant gloves
Additional protection: Gloves must be inspected prior to use., Gloves should

be discarded and replaced if there is any indication of degradation or chemical breakthrough., As the product is a mixture of several substances, the durability of the glove materials cannot be calculated in advance and has to be tested before use., The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other., Request information on glove permeation properties from the glove supplier., Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.

Eye protection : Wear safety glasses with side shields.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.
Lightweight protective clothing
Safety shoes

Exposure Guidelines
Exposure Limit Values

N-Methyl-2-pyrrolidone				
AEL *	(DUPONT)	5 ppm	8 & 12 hr. TWA, Skin	
Methanol				
PEL:	(OSHA)	200 ppm	260 mg/m3	8 hr. TWA
TLV	(ACGIH)	250 ppm Skin designation	STEL	
TLV	(ACGIH)	200 ppm	TWA	
AEL *	(DUPONT)	200 ppm Skin designation	8 & 12 hr. TWA, Skin	

Biological Exposure Indices

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N-Methyl-2-pyrrolidone			
BEI	(ACGIH)	100 mg/l 5-Hydroxy-N-methyl-2-pyrrolidone/Urine Sampling time: End of shift.	
Methanol			
BEI	(ACGIH)	15 mg/l Methanol/Urine Sampling time: End of shift.	

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form : liquid
Color : brown
Odor : aromatic
Water solubility : partly soluble

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid : Exposure to light. Heat, flames and sparks.

Incompatibility : Strong acids Strong bases, Strong oxidizing agents, Strong reducing agents, Peroxides, Free radical initiators

Hazardous decomposition products : Hazardous thermal decomposition products may include:
Carbon dioxide (CO2), Carbon monoxide, Hydrocarbons, Formaldehyde, nitrogen oxides (NOx), silicon oxides

Hazardous reactions : Polymerization can occur if this product is blanketed with nitrogen, exposed to temperatures greater than 32°C, or exposed to UV light.

SECTION 11. TOXICOLOGICAL INFORMATION

N-Methyl-2-pyrrolidone
Dermal LD50 : > 5,000 mg/kg , rat

Oral LD50	:	4,150 mg/kg , rat
Inhalation 4 h LC50	:	> 5.1 mg/l , rat Target Organs: Respiratory Tract Respiratory tract irritation
Skin irritation	:	No skin irritation, rabbit
Eye irritation	:	Eye irritation, rabbit
Skin sensitization	:	Does not cause skin sensitisation., mouse
Repeated dose toxicity	:	Oral rat Reduced body weight gain Inhalation rat Respiratory irritation Dermal rabbit No toxicologically significant effects were found.
Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity	:	Animal testing showed effects on reproduction at levels equal to or above those causing parental toxicity. Reduced fertility
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity. Reduced embryo-foetal viability Foetal malformations

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3,6,9-Trioxaundecamethylene dimethacrylate

Dermal LD50	:	> 3,000 mg/kg , rabbit
Oral LD50	:	> 5,000 mg/kg , rat
Skin irritation	:	Mild skin irritation, rabbit
Eye irritation	:	Eye irritation, animals (unspecified species)
Skin sensitization	:	Did not cause sensitisation on laboratory animals., guinea pig May cause sensitisation of susceptible persons by skin contact.
Repeated dose toxicity	:	Dermal multiple species No toxicologically significant effects were found.
Mutagenicity	:	Tests on mammalian cell cultures showed mutagenic effects. Did not cause genetic damage in cultured bacterial cells.
Teratogenicity	:	Did not show teratogenic effects in animal experiments.

Methanol

Dermal Acute toxicity estimate	:	300 mg/kg
Dermal	:	animals (unspecified species) Target Organs: Central nervous system Central nervous system effects narcosis eye effects
Inhalation Acute toxicity estimate	:	3 mg/l
Inhalation	:	animals (unspecified species) Target Organs: Central nervous system Central nervous system effects narcosis eye effects
Skin irritation	:	Slight or no skin irritation, rabbit
Eye irritation	:	slight irritation, rabbit

Skin sensitization	:	Did not cause sensitisation on laboratory animals., guinea pig
Carcinogenicity	:	Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Overall weight of evidence indicates that the substance is not mutagenic. Did not cause genetic damage in animals. Genetic damage in cultured mammalian cells was observed in some laboratory tests but not in others. Genetic damage in cultured bacterial cells was observed in some laboratory tests but not in others.
Reproductive toxicity	:	Evidence suggests the substance is not a reproductive toxin in animals.
Teratogenicity	:	Evidence suggests the substance is not a developmental toxin in animals.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

N-Methyl-2-pyrrolidone

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) > 500 mg/l
72 h ErC50	:	Desmodesmus subspicatus (green algae) 600.5 mg/l
72 h NOEC	:	Desmodesmus subspicatus (green algae) 125 mg/l
21 d	:	NOEC Daphnia magna (Water flea) 12.5 mg/l OECD Test Guideline 211

Methanol

96 h LC50	:	Pimephales promelas (fathead minnow) 28,100 mg/l
96 h LC50	:	Selenastrum capricornutum (green algae) 22,000 mg/l
48 h EC50	:	Daphnia > 10,000 mg/l

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Environmental Fate

N-Methyl-2-pyrrolidone

Biodegradability	:	73 % OECD Test Guideline 301C Readily biodegradable, according to appropriate OECD test.
Bioaccumulation	:	Accumulation in aquatic organisms is unlikely.

Methanol

Biodegradability	:	Readily biodegradable.
Bioaccumulation	:	Bioaccumulation is unlikely.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal	:	If recycling is not practicable, dispose of in compliance with local regulations. Never place unused product down any indoor or out door drain.
Container Disposal	:	Do not reuse empty container. Contaminated/not cleaned containers should be treated/handled like product waste. Dispose of container properly. Refer to applicable Local, State/Provincial, and Federal Regulations, as well as industry Standards.

SECTION 14. TRANSPORT INFORMATION

Not classified as dangerous in the meaning of transport regulations.

SECTION 15. REGULATORY INFORMATION

TSCA Status	:	On the inventory, or in compliance with the inventory
SARA 313 Regulated	:	N-Methyl-2-pyrrolidone , Methanol

Chemical(s)

CERCLA Reportable Quantity	: 212,314 lbs Based on the percentage composition of this chemical in the product.: Methylamine
California Prop. 65	: WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.N-Methyl-2-pyrrolidone , Methanol
PA Right to Know Regulated Chemical(s)	: Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): N-Methyl-2-pyrrolidone , Methanol
NJ Right to Know Regulated Chemical(s)	: Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): N-Methyl-2-pyrrolidone , Methanol

SECTION 16. OTHER INFORMATION

Contact person : HD MicroSystems™, Customer Service, 800-346-5656

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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