SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Chemical product name: **EPINAL EN-4900F**

Name of manufacture: Hitachi Chemical Company Ltd. Yamazaki Works

Address: 4-13-1 Higashi-cho, Hitachi-shi Ibaraki, 317-8555, Japan

Name of section: Advanced Integrated Materials Business Sector

Advanced Paste R&D Dept. Mr. K. Yamada

Phone number: +<81> 294-23-8917 (Japan) FAX number: +<81> 294-21-3328 (Japan)

Emergency Number: Hitachi Chemical International Co. , (Taiwan) Ltd. <886> (2) 2581-3632 (Taipei) (Business hours)

Hitachi Chemical Co., Ltd. Yamazaki Works +<81> 294-23-8907 (Japan) (24hours)

For other information: +<81> 294-23-8917 (Japan)

Recommended use of the chemical and restrictions on use: Material for semiconductor

2. HAZARDS IDENTIFICATION

[GHS CLASSIFICATION]

PHYSICAL HAZARDS:	Flammable liquids;		Not classified
HEALTH HAZARDS:	Acute toxicity	Oral;	Category 5
		Dermal;	Category 5
		Inhalation;	Classification not possible
	Skin corrosion/irritation;		Classification not possible
	Serious eye damage/eye irritation;		Category 2B
	Respiratory sensitization;		Classification not possible
	Skin sensitization;		Category 1
	Germ cell mutagenicity;		Classification not possible
	Carcinogenicity;		Classification not possible
	Reproductive toxicity;		Classification not possible
	Specific target organ toxicity – Single exposure;		Category 1 (Respiratory system)
	Specific target organ toxicity – Repeated exposure;		Category 1 (Eye, Respiratory system)
	Aspiration hazard; Classification not possible		

ENVIRONMENTAL HAZARDS:

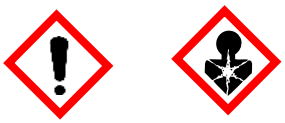
Hazardous to the aquatic environment: Acute: Classification not possible

Chronic: Classification not possible

(Continued on next page)

[GHS LABEL ELEMENTS]

Symbol:



Signal word: Danger

Hazard statements:

- May be harmful if swallowed
- May be harmful in contact with skin
- Causes eye irritation
- May cause an allergic skin reaction
- Cause damage to organs (Respiratory system)
- Cause damage to organs (Eye, Respiratory system) through prolonged or repeated exposure

Precautionary statements:

Prevention

- Wear protective gloves.
- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Contaminated work clothing should not be allowed out of the workplace.
- Do not eat, drink or smoke when using this product.
- Wash hands thoroughly after handling.
- Do not breathe dust/fume/gas/mist/vapours/spray.

Response

- Call a POISON CENTER or doctor/physician if you feel unwell.
- IF INHALED: Call a POISON CENTER or doctor/physician if you feel unwell
- If skin irritation occurs, get medical advice/attention.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If eye irritation persists, get medical advice/attention.
- Wash hands after handling.
- IF ON SKIN: Wash with plenty of soap and water.
- If skin irritation or rash occurs, seek medical advice/attention.
- Wash contaminated clothing before reuse.
- IF exposed: Call a POISON CENTER or doctor/physician.
- Get medical attention/advice if you feel unwell.

Storage:

- Store locked up.

Disposal:

- Dispose of contents/container in according with local/regional/national/international regulation.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Substance/Mixture: Mixture

General product description: Silver color and combustible paste

Ingredients and composition:

Chemical name	Composition (wt. %)	Chemical formula	CAS No.
Acrylic resin	5 – 10	–	Trade Secret
Polybutadiene derivative	5 – 15	–	Trade Secret
Butadiene copolymer	< 1.0	–	Trade Secret
Acrylate	5 – 10	–	Trade Secret
Peroxide	< 1.0	–	Trade Secret
Additive	1.0 – 2.0	–	Trade Secret
Silver	70 – 80	Ag	7440-22-4

UN Class: Not applicable UN No.: Not applicable

All components are not listed on the First Stage of 1062 substances and Second Stage of 1089 substances for GHS compliance in Taiwan.

4. FIRST – AID MEASURES

Inhalation: Remove the victim from the contamination immediately to fresh air. If breathing is weak, irregular or has stopped, open his airway, loosen his collar and belt and administer artificial respiration. And refer for medical attention

Skin contact: Remove all contaminated clothing. Wash the affected area with plenty of water with mild soap. If irritation is continued, refer to medical attention

Eye contact: Gently rinse the affected eyes with clean water for at least 15 minutes. Ask the victim to look up, down and side-to-side in order to better reach all parts of eyes. And refer to medical attention.

Ingestion: Do not induce vomiting and refer to medical attention. Never give anything to someone who is unconscious.

5. FIRE – FIGHTING MEASURES

Flammable properties: Flash point >114℃

Suitable extinguishing media: Dry chemical powder, carbon dioxide, foam, dry sand.

Specific hazards regarding with regard to fire-fighting measure

・Dry chemical powder ,carbon dioxide or dry sand should be used for small fires.

・Apply water from a safe distance to cool and protect surrounding area. Move container from fire areas if it can be done without risk.

・Firefighters should wear proper protective equipment and self-breathing apparatus

・Evacuate non-essential personnel into surrounding area of fires.

・Hazardous combustion products: Carbon monoxide, smoke, fumes and oxides of carbon.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:

・Evacuate personnel to safe area.

・Ventilate area after picking up material completely and shut off all sources of ignition.

・Prevent product reaching to sewage and drainage.

・Wear proper protective equipment.

Methods and materials for containment and cleaning up:

・Place spill in a chemical waste containers using non-sparkling tools.

・Wipe off residual spill using paper absorbed with methanol or acetone.

Environmental precautions:

・Consult an expert on the disposal of recovered material.

・Don't wash away into water courses and river.

7. HANDLING AND STORAGE

Handling:

・Shut off all gas pilot and electrical igniters and other sources of ignition during use and until all vapors gone.

・Avoid release of this material into sewer or drainage.

・In case of handling, wear proper protective equipment to avoid contact and inhalation.

・Use local exhaust ventilation

・If feel abnormality in the body or abnormality on the body observed, make sure to get medical advice/attention after taking the emergency measures refer to Section 4.

Storage:

・Keep containers tightly closed and store below -18℃.

・Keep away from heat, steam pipe and sunlight.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure control: Use this product only in a totally enclosed systems or local exhaust ventilation.
Make available in the work area with emergency shower and eyes washer.

Control parameters: ACGIH TLV (2012) [1)]: TWA 0.1mg/m^3 STEL Not established. (Silver metal powder)
OSHA PEL(1994): TWA 0.01mg/m^3 (Silver metal powder)
TWA: Time-Weighted Average STEL: Short Term Exposure Limit
TLV: Threshold Limited Value PEL: Permissive Exposure Limit

Engineering measure: Do not use in area without adequate ventilation and local exhaust ventilation.

Personal protection equipment:

・Respiratory protection: Chemical cartridge respirator with inorganic vapor cartridge.

・Eye protection: Safety goggles or face shield.

・Hand, skin and body protection: Chemical – resistant gloves, impervious boots and apron or full – body suit.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Silver color paste
Odor:	Slightly irritant odor
Boiling point :	No data available
Vapor pressure (Pa):	No data available
Density:	approx. 3.5g/ml @25℃ (Product)
Solubility in water:	Slightly soluble (Polybutadiene derivative [2] and Acrylate [3])
Solubility in organic solvents:	Soluble
Flash point:	≥114℃(Product), 114℃(Peroxide) [4], 139℃(Acrylate) [3], 149℃(Additive) [5]
Auto-ignition temperature:	>200℃(Additive) [5]
Explosive properties:	No data available

10. STABILITY AND REACTIVITY

Stability:	Stable under normal condition.
Material to avoid:	Oxidizing agents, acid, alkalis
Hazardous decomposition product:	Carbon oxides, nitrogen oxides and various kinds of hydrocarbons.
Hazardous polymerization:	Will not occur.

11. TOXICOLOGICAL INFORMATION

Route of entry: May cause absorption in the body by inhalation, dermal and oral.

Corrosive and irritant properties: This material is irritating to eyes, skin, mucous membrane and respiratory tract. Repeated or prolonged contact may cause dermatitis.

Acute toxicity: [2) 3) 4) 5) 6) 7) 8) 9)]

Chemical name	ORAL LD_{50}	DERMAL LD_{50}	INHALATION LC_{50}
Polybutadiene derivative	>2000mg/kg(rat)	No data	No data
Acrylate	>4660mg/kg(rat)	>2540mg/kg(rabbit)	No data
Peroxide	>5000mg/kg (rat)*	No data	>207.2mg/l (rat, 4hrs)*
Additive	7010mg/kg(rat)	3970ul/kg (rabbit)	>5.3mg/l(rat, 4hrs)
Silver	>5000mg/kg (rat)	>2000mg/kg (rat)	TCLo:1mg/m^3(human)

* 65% diluted solution

LD_{50}: Lethal dose 50% kill LC_{50} : Lethal dose 50% kill TCLo: Toxic concentration lowest

Skin corrosion/irritation: Skin rabbit Moderate (P. I. I=0.1) (Acrylic resin) [7)]

Serious eye damage/eye irritation: Eye rabbit Mild (Acrylate, Silver powder) [3), 9)]

Allergenic effects: Allergenic and sensitizing effects are recognized in silver powder and peroxide and prolonged or repeated skin contact may cause allergenic dermatitis.[4), 9)]

Carcinogenic effects: Not classified in IARC, ACGIH, EU and NTP.[10)]

(Continued on next page)

Specific target organ toxicity-Single exposure: Silver powder causes damage to respiratory organ.[9)]

Specific target organ toxicity-Repeated exposure: Silver powder causes damage to respiratory organ through prolonged or repeated exposure.[9)]

12. ECOLOGICAL INFORMATION

Biodegradability: No relevant information is found.

Bioaccumulation: No relevant information is found.

Eco-toxicity: Silver may cause adverse effects to aquatic life. [11)]

13. DISPOSAL CONSIDERATIONS

Information on their safe handing of disposal:

・Do not dump into sewers, on the ground or into any body of water.

Appropriate methods of disposal:

・Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in general careful matter as flammable liquid.

・Follow all regulation in your country or region.

14. TRANSPORT INFORMATION

Any especial precaution on the transport or conveyance:

・Keep this product with enough dry ice.

・Keep away from strong alkalis, strong acid. alkali metals, oxidizing materials and source of ignition.

・United Nation's recommendation and other international agreements on the transport and packaging.

UN Class: Not applicable UN No.: Not applicable

・Marine pollutant: No

・Type of container for supply: Plastic syringe or small bottle.

・Follow all regulation on the transport in your country or region.

15. REGULATORY INFORMATION

Classification and labeling in accordance with Labor Safety and Health Act:

See Section 2.

Other regulations for foreign countries:

・According to the OSHA HCS, this product is considered a hazardous chemical (Silver metal).

・Regulatory information with regard to this product in your country or in your region should be examined by your own responsibility.

16. OTHER INFORMATION

References:

1) TLVs and BEIs (ACGIH 2012)
2) Material Safety Data Sheet of Polybutadiene derivative (2011)
3) Material Safety Data Sheet of Acrylate (2011)
4) Material Safety Data Sheet of Peroxide (2008)
5) Material Safety Data Sheet of Additive (2012)
6) Material Safety Data Sheet of Butadiene copolymer (2007)
7) Material Safety Data Sheet of Acrylic resin (2011)
8) Registry of Toxic Effects of Chemical Substances (2012 CD-ROM DB)
9) GHS Classification Data Base of National Institute of Technology and Evaluation (Japan)
10) IARC Monograph Vol.1-Vol.102 (2011)
11) International Chemical Safety Card (WHO/ILO/UNEP)

Inquiry of the information contained here in:

Hitachi Chemical Company Ltd. Yamazaki Works
Advanced Integrated Materials Business Sector Advanced Paste R&D Dept. Mr. K. Yamada
Tel. No. +<81> 294-23-8917 (Japan)

The information herein is given in good faith, but no warranty, express or implied, is made.
Please consult the HITACHI CHEMICAL CO., LTD. for further information.

The information contained herein is, to the best of HITACHI CHEMICAL COMPANY'S knowledge and belief, accurate and reliable as of the data issued.
It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions.
We reserve the right to revise SDS periodically as new information becomes available.