

MATERIAL SAFETY DATA SHEET

SILVER NANOWIRES IN WATER

SECTION 01 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product name : Silver Nanowires in Water

Company name: **Nanostructured & Amorphous Materials, Inc.**
16840 Clay Road, Suite #113
Houston, TX 77084, USA

SECTION 02 - HAZARDS IDENTIFICATION

Emergency overview:

This product contains hazardous material. This product causes eye, skin, and respiratory tract irritation.

Target Organs:

Eyes, Skin, Respiratory tract.

Overexposure effects:

ROUTES OF ENTRY:	Ingestion, inhalation, skin and eye contact.
INHALATION:	May be harmful if inhaled. Material may be irritating to nasal septum, throat, mucous membranes and upper respiratory tract
SKIN CONTACT:	membranes and upper respiratory tract
EYE CONTACT:	May cause eye irritation or blue-gray eyes
INGESTION:	May be harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
CHRONIC:	Absorption of silver compounds by ingestion, inhalation or through broken skin can cause argyria, a permanent bluish-gray discoloration of the skin, conjunctiva and mucous membranes.

SECTION 03 - COMPOSITION / INFORMATION ON INGREDIENTS

	<u>MATERIAL</u>	<u>CAS #</u>	<u>AMOUNT</u>
SILVER		7440-22-4	0.5-5%
WATER:		7732-18-5	99.5-95%

SECTION 04 - FIRST AID MEASURES

SKIN:	Flush with copious amounts of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Seek medical attention if irritation develops or persists. Wash clothing before reuse. Thoroughly clean shoes before reuse.
EYES:	Flush with copious amounts of pure water for at least 15 minutes, occasionally lifting lower and upper eyelids. Seek medical attention immediately.
INGESTION:	If conscious, wash out mouth with water. Seek medical attention immediately.
INHALATION:	Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

SECTION 05 - FIRE-FIGHTING MEASURES

FLASH POINT:	Silver particles (ultra-fine powder) may burn in air. Combustion of silver suspension may cause the release of toxic metal oxide fume.
EXTINGUISHING MEDIA:	Sand or dry powder type specially designed for this material fires.

FIRE FIGHTING PROCEDURES - SPECIAL:	Do not use water.
SPECIAL PROCEDURES:	Remove all ignition sources. Use self contained breathing apparatus.
DECOMPOSITION PRODUCTS:	None
AUTOIGNITION TEMPERATURE:	Carbon monoxide, carbon dioxide
Autoignition temperature	None
NFPA RATINGS:	Health=0, Flammability=0, Reactivity=1
SPECIAL HAZARDS CAUSED BY THE MATERIAL, ITS PRODUCTS OF COMBUSTION OR RESULTING GASES	In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demanded or other positive pressure mode.

SECTION 06 - ACCIDENTAL RELEASE MEASURES

PERSON-RELATED SAFETY PRECAUTIONS:	Wear eye protection, self-contained breathing apparatus, boots, and protective gloves. Wear disposable coveralls and discard after use. Sweep up the spill, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pick-up is complete.
MEASURES FOR ENVIRONMENTAL PROTECTION:	Prevent from spreading or entering into drains, ditches or rivers by using sand, earth or other appropriate barriers.
SPILL PROCEDURES:	Determine whether to evacuate or isolate the area according to your local emergency plan. Eliminate all ignition sources. Avoid all personal contact. Use eye and skin protection. Take up with absorbent material. Shovel into closable containers. Flush contaminated area with water.
WASTE DISPOSAL METHODS:	Refer to Section 13.

SECTION 07 - HANDLING AND STORAGE

HANDLING:	Wash hand thoroughly after using, especially before eating, drinking or smoking. Wear chemical splash goggles and solvent resistant gloves. Avoid contact with eyes, skin and clothing. Avoid inhalation and ingestion.
TECHNICAL MEASURES:	Use with adequate ventilation. No special equipment is deemed necessary under normal usage.
STORAGE:	Store in tightly sealed container. Ground all metal containers during storage and handling to avoid buildup of electrostatic charges. Store at low temperature. Avoid direct sunshine, heat. Avoid long term storage at elevated temperatures.

SECTION 08 - EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS:	Use explosion proof local exhaust ventilation. An eyewash fountain and a safety shower should be readily available in areas of use or handling.								
EXPOSURE LIMITS:	<table> <thead> <tr> <th><u>Chemical Name</u></th> <th><u>ACGIH</u></th> <th><u>NIOSH</u></th> <th><u>OSHA - Final PELs</u></th> </tr> </thead> <tbody> <tr> <td>Silver (metallic)</td> <td>0.1mg/m³ TWA</td> <td>0.01mg/m³</td> <td>0.01 mg/m³ TWA</td> </tr> </tbody> </table>	<u>Chemical Name</u>	<u>ACGIH</u>	<u>NIOSH</u>	<u>OSHA - Final PELs</u>	Silver (metallic)	0.1mg/m ³ TWA	0.01mg/m ³	0.01 mg/m ³ TWA
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Silver (metallic)	0.1mg/m ³ TWA	0.01mg/m ³	0.01 mg/m ³ TWA						
OSHA Vacated PELs:	Silver (metallic): 0.01 mg/m ³ TWA								
PERSONAL PROTECTIVE EQUIPMENT									
Eyes:	Wear chemical splash goggles								
Skin:	Wear solvent resistant gloves to prevent skin contact.								
Clothing:	Wear appropriate protective clothing to prevent skin								
Respirators:	If the TLV of the product is exceeded, a mechanical exhaust system or appropriate NIOSH approved self-contained breathing apparatus is advised. Follow OSHA regulations in 29 CFR 1910.134 or European Standard EN 149.								

SECTION 09 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Gray suspension
COLOR:	Gray
Odor:	None
SPECIFIC GRAVITY:	1.30-3.50 (H ₂ O = 1)
SOLUBILITY IN WATER:	Insoluble
PERCENT VOLATILE:	< 1.0%
VAPOR DENSITY:	>AIR
EVAPORATION RATE:	N/A
BOILING POINT:	100°C (184.8F)
VAPOR PRESSURE:	N/A

SECTION 10 - STABILITY AND REACTIVITY

STABILITY:	Stable under ordinary conditions of use and storage.
CONDITIONS TO AVOID:	Suspension sputtering and incompatibles.
INCOMPATIBILITY (Materials to avoid):	Strong oxidizers, acids and alkalis, primary and secondary amines, Acetylene, ammonia, strong hydrogen peroxide solutions, strong acids, oxalic acid, tartaric acid, bromoazide, chlorine trifluoride, and ethyleneimine.
HAZARDOUS DECOMPOSITION PRODUCTS:	Metal oxide fume.
HAZARDOUS POLYMERIZATION:	Will not occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

NTP KNOWN CARCINOGEN:	No
NTP ANTICIPATED CARCINOGEN:	No
IARC CATEGORY:	None

SECTION 12 - ECOLOGICAL INFORMATION

GENERAL NOTES:	This substance may be hazardous to the environment; special attention should be given to aquatic organisms.
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SECTION 13 - DISPOSAL CONSIDERATIONS

GENERAL:	The silver components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory. This material and its container must be as hazardous disposed of waste. Processing, use, or contamination of this product may change the waste management options. The silver components of this product are listed on the Canadian Domestic Substances List (DSL).
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SECTION 14 - TRANSPORT INFORMATION

CLASSIFICATION:	A hazardous material for transportation.
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SECTION 15 - REGULATORY INFORMATION

FEDERAL AND STATE:

Rhode Island RTK hazardous substances:	Silver
Pennsylvania RTK:	Silver
Minnesota:	Silver
Massachusetts RTK:	Silver
New Jersey:	Silver
TSCA 8(b) inventory:	Silver
TSCA 8(a) PAIR:	Silver
TSCA 8(d) H and S data reporting:	Silver
SARA 313 toxic chemical notification and release reporting:	Silver: 1%
CERCLA: Hazardous substances.:	Silver: 1000 lbs. (453.6 kg)

OTHER REGULATIONS:

OSHA:	Hazardous by definition of Hazard Communication Standard
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(29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

OTHER CLASSIFICATION:

WHMIS (Canada):

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC): R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: J

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard: 0

Protective Equipment: Not applicable.

Lab coat.

Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

SECTION 16 - ADDITIONAL INFORMATION

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Label Precautions:

Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling.

Avoid breathing dust or vapors.

Keep container closed.

Use only with adequate ventilation.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, seek medical attention.

Product Use: Laboratory Reagent.

Disclaimer:

THE INFORMATION ON THIS MSDS REPRESENTS OUR CURRENT DATA AND BEST RECOMMENDATION AS TO THE PROPER HANDLING OF THIS PRODUCT UNDER NORMAL CONDITIONS. HOWEVER, NO GUARANTEE OR WARRANTY OF ANY KIND EXPRESSED OR IMPLIED IS MADE WITH RESPECT TO THE INFORMATION CONTAINED HEREIN. NO LIABILITY IS ASSUMED FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION CONTAINED HEREIN. FINAL DETERMINATION OF SUITABILITY OF THIS MATERIAL IS THE SOLE RESPONSIBILITY OF THE USER. ANY USE OF THIS PRODUCT WHICH IS NOT IN CONFORMANCE WITH THE PROCEDURES IN THIS MSDS OR WHICH INVOLVES USING THIS PRODUCT IN COMBINATION WITH ANY OTHER PRODUCT OR ANY OTHER PROCESS IS THE SOLE RESPONSIBILITY OF THE USER.