Material Safety Data Sheet

acc. to OSHA and ANSI

1 Identification of substance:

- **Product details:**
- **Product name: Zero-Valent Iron Nanoparticles**
- **Stock number: 8001NJ**
- **Manufacturer/Supplier:**
  Nanostructured & Amorphous Materials, Inc.
  16840 Clay Road, Suite #113
  Houston, TX 77084, USA

2 Composition/Data on components:

- **Chemical characterization:**
  Description: (CAS#)
  Iron (CAS# 7439-89-6), 100%
- **Identification number(s):**
- **EINECS Number:** 231-096-4

3 Hazards identification

- **Hazard description:**
  Xi Irritant
- **Information pertaining to particular dangers for man and environment**

  R 36/37 Irritating to eyes and respiratory system.
- **Classification system**
- **HMIS ratings (scale 0-4)**

  (Hazardous Materials Identification System)
  Health (acute effects) = 1
  Flammability = 2

Reactivity = 2

- **4 First aid measures**

- **After inhalation**
  Supply fresh air. If required, provide artificial respiration. Keep patient warm.
  Seek immediate medical advice.
- **After skin contact**
  Immediately wash with water and soap and rinse thoroughly.
  Seek immediate medical advice.
- **After eye contact**
  Rinse opened eye for several minutes under running water. Then consult a doctor.
- **After swallowing** Seek immediate medical advice.
- **Information for doctor**
- **The following symptoms may occur:**
  Nausea
  Cramp
  Gastric or intestinal disorders.

- **5 Fire fighting measures**

- **Suitable extinguishing agents** Extinguishing powder. Do not use water.
- **For safety reasons unsuitable extinguishing agents**
  Water
  Carbon dioxide
  Halogenated extinguisher
- **Protective equipment:**
  Wear self-contained respirator.
  Wear fully protective impervious suit.

- **6 Accidental release measures**

- **Person-related safety precautions:**
  Wear protective equipment. Keep unprotected persons away.
  Ensure adequate ventilation
  Keep away from ignition sources
- **Measures for environmental protection:**
  Do not allow material to be released to the environment without proper governmental permits.
- **Measures for cleaning/collecting:**

Ensure adequate ventilation.
Keep away from ignition sources.

- **Additional information:**
  See Section 7 for information on safe handling
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.

7 Handling and storage

- **Handling**
- **Information for safe handling:**

Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.

- **Information about protection against explosions and fires:**
  Keep ignition sources away.
  Protect against electrostatic charges.
  Fumes can combine with air to form an explosive mixture.

- **Storage**
- **Requirements to be met by storerooms and receptacles:**
  Store in a cool location.
- **Information about storage in one common storage facility:**
  Do not store together with oxidizing and acidic materials.
  Store away from halogens.
  Store away from air.
  Store away from water/moisture.
- **Further information about storage conditions:**
  Store under dry inert gas.
  Keep container tightly sealed.
  Store in cool, dry conditions in well sealed containers.

8 Exposure controls and personal protection

- **Additional information about design of technical systems:**
  Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Components with limit values that require monitoring at the workplace:
Not required.

- **Additional information:** No data

- **Personal protective equipment**

- **General protective and hygienic measures**
  The usual precautionary measures for handling chemicals should be followed.
  Keep away from foodstuffs, beverages and feed.
  Remove all soiled and contaminated clothing immediately.
  Wash hands before breaks and at the end of work.
  Avoid contact with the eyes.
  Avoid contact with the eyes and skin.
- **Breathing equipment:**
  Use suitable respirator when high concentrations are present.
- **Protection of hands:** Impervious gloves
- **Eye protection:** Safety glasses
- **Body protection:** Protective work clothing.

- **9 Physical and chemical properties:**

- **General Information**

- **Form:** Powder
- **Color:** Black
- **Odor:** Odorless

	Value/Range	Unit	Method
Change in condition			
Melting point/Melting range:	1536	° C	
Boiling point/Boiling range:	3000	° C	
Sublimation temperature / start:	Not determined		
Flash point:	Not applicable		
Flammability (solid, gaseous)	Product is not flammable.		
Ignition temperature:	Not determined		
Decomposition temperature:	Not determined		
Explosion limits:			
Lower:	Not determined		
Upper:	Not determined		
Vapor pressure:	at 1787 ° C	1.33 hPa	
Density:	at 20 ° C	7.87 g/cm³	

- **Solubility in / Miscibility with**
- **Water:** Insoluble

- **10 Stability and reactivity**

- **Thermal decomposition / conditions to be avoided:**
  Decomposition will not occur if used and stored according to specifications.
- **Materials to be avoided:**
  Acids
  Water/moisture
  Oxidizing agents
  Air
  Halogens
- **Dangerous reactions** Reacts with strong oxidizing agents
- **Dangerous products of decomposition:** Metal oxide fume

- **11 Toxicological information**

- **Acute toxicity:**
  LD/LC50 values that are relevant for classification:
  Oral: LD50: 20000 mg/kg (gpg)
  LD50: 30000 mg/kg (rat)
  LDLo: 20 mg/kg (rbt)
- **Primary irritant effect:**
- **on the skin:** Irritant to skin and mucous membranes.
- **on the eye:** Irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Other information (about experimental toxicology):**
  Tumorigenic effects have been observed on tests with laboratory animals.
- **Subacute to chronic toxicity:**
  Iron compounds may cause vomiting, diarrhea, pink urine, black stool, and liver damage. May cause damage to the kidneys. Irritating to the respiratory tract, they may cause pulmonary fibrosis if dusts are inhaled.
- **Additional toxicological information:**
  To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
  The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for components in this product.
  No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

- **12 Ecological information:**

  - **General notes:**
    Do not allow material to be released to the environment without proper governmental permits.

- **13 Disposal considerations**

  - **Product:**
  - **Recommendation**
    Consult state, local or national regulations to ensure proper disposal.

  - **Uncleaned packagings:**
  - **Recommendation:**
    Disposal must be made according to official regulations.

- **14 Transport information**

  Not a hazardous material for transportation.

  - **DOT regulations:**
  - **Hazard class:** None
  - **Land transport ADR/RID (cross-border)**
  - **ADR/RID class:** None
  - **Maritime transport IMDG:**
  - **IMDG Class:** None
  - **Air transport ICAO-TI and IATA-DGR:**
  - **ICAO/IATA Class:** None

  - **Transport/Additional information:**
    Not dangerous according to the above specifications.

- **15 Regulations**

  - **Product related hazard informations:**
  - **Hazard symbols:** Xi Irritant
  - **Risk phrases:**
    36/37/38 Irritating to eyes, respiratory system and skin.

- **Safety phrases:**
  26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
  37/39 Wear suitable gloves and eye/face protection.
- **National regulations**
  All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory.
- **Information about limitation of use:**
  For use only by technically qualified individuals.

- **16 Other information:**

  Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement 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.