# Safety Data Sheet

Skyspring Nanomaterials, Inc. www.ssnano.com

Revision on 12/01/2016

1 Identification of substance:

Product details:
Product name: Alloy of aluminum (Al) and silicon (Si)
Stock number: 0272DX
Manufacturer/Supplier:
SkySpring Nanomaterials, Inc.
2935 Westhollow Dr., Houston, TX 77082, USA
Phone: 281-870-1700
Fax: 281-870-8002
Email: sales@ssnano.com

2 Composition/Data on components:

Chemical characterization:
Description: (CAS#)

| CAS # | Component | Percent |
|---|---|---|
| 7429-90-5 | Aluminum | 88+/-1 |
| 7440-21-3 | Silicon | 12+/-1 |

3 Hazards identification

**EMERGENCY OVERVIEW**

Solid, finely divided powder. Silvery to gray color. Odorless. Dust or fines dispersed in the air can be explosive.
Dust and fines may be readily ignitable.
Explosion/fire hazards may be present when (See Sections 5, 7 and 10 for additional information):
***** Dust or fines are dispersed in the air.
***** Dust or fines are in contact with water.
***** Dust or fines are in contact with certain metal oxides (e.g. rust).
Do not use water for spill clean-up. Use natural bristle broom (push type recommended) and non-sparking tools.
Avoid all ignition sources. Prohibit smoking.

**POTENTIAL HEALTH EFFECTS**

The following statements summarize the health effects generally expected in cases of overexposures. User specific situations should be assessed by a qualified individual. Additional health information can be found in Section 11.

**Eyes:** Can cause mechanical irritation.
**Skin:** Can cause mechanical irritation.
**Ingestion:** Can cause irritation.
**Inhalation:** Can cause irritation of upper respiratory tract.
**Carcinogenicity and Reproductive Hazard**

Does not present any cancer or reproductive hazards.

**Medical Conditions Aggravated By Exposure to Product, Components or Compounds Formed During Processing**

Asthma, chronic lung disease, and skin rashes.

4 First aid measures

**First Aid: Eyes**

Flush eyes with plenty of water or saline for at least 15 minutes. Consult a physician.

**First Aid: Skin**

Wash skin with soap and water for at least 15 minutes. Consult a physician if irritation persists.

**First Aid: Ingestion**

If swallowed, dilute by drinking large amounts of water. Recommend quantities up to 30 mL (~1 oz.) in children and 250 mL (~9 oz.) in adults. *Never give anything by mouth to a convulsing or unconscious person.* Do **not** induce vomiting. Consult a physician.

**First Aid: Inhalation**

Remove to fresh air. If unconscious or severely injured, check for clear airway, breathing and presence of pulse.

Perform CPR if there is no pulse or respiration. Consult a physician.

5 Fire fighting measures

**Flammable/Combustible Properties**

Dust or fines dispersed in the air can be explosive. Dust and fines may be readily ignitable.

**Fire/Explosion**

Care should be taken, however, during bulk handling to prevent accumulation/generation over time of 75 micron or finer particles. Otherwise, a potentially explosive mixture could be generated.

May be a potential hazard under the following conditions:

***** Dust or fines dispersed in the air can be explosive. Even a minor dust cloud can explode violently. Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.

***** Dust or fines in contact with water can generate flammable/explosive hydrogen gas. Hydrogen gas could present an explosion hazard in confined or poorly ventilated spaces.

***** Dust or fines in contact with certain metal oxides (e.g., rust). A thermite reaction, with considerable heat generation, can be initiated by a weak ignition source.

**Extinguishing Media**

Use gentle surface application of Class D extinguishing agent or dry inert granular material (e.g. sand) to cover and ring the burning material. If possible, isolate the burning material. Allow the fire to burn out. Avoid mixing of the extinguishing agent with the burning material. Do not disturb the material until completely cool.

**Unsuitable Extinguishing Media**

DO NOT USE:

***** Water.

***** Halogenated agents.

***** ABC dry chemical agents.

These agents will react with the burning material.

**Fire Fighting Equipment/Instructions**

Fire fighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.

6 Accidental release measures

**Small/Large Spill**

Avoid all ignition sources around spill. Prohibit smoking. Do not use water for spill clean-up. Avoid dusting of powder to the greatest extent possible. Use natural bristle broom (push type recommended) and non-sparking tools. Recover using non-sparking tools and place in a dry, water-tight, sealed container. After complete cleaning, area may be washed down with large quantities of water..

7 Handling and storage

**Handling/Storage**

Product should be kept dry. Avoid generating dust. Prohibit smoking. Storage rooms must be of fire-resistant construction. Do not store powder in same room as other combustible materials. Care should be taken during bulk handling to prevent accumulation/generation over time of 75 micron or finer particles.

**Requirements for Processes Which Generate Dusts or Fines**

Obtain and follow the safety procedures and equipment guides contained in Aluminum Association Bulletin TR-2 and National Fire Protection Association (NFPA) brochures listed in Section 16. Use non-sparking handling equipment. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during dust handling and transfer operations. (See Section 15).

Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuums and electrostatic precipitators must not be used. Dust collection systems must be dedicated to aluminum dust

only and should be clearly labeled as such. Do not co-mingle fines of aluminum with fines of iron, iron oxide (rust) or other metal oxides.
Process equipment, storage containers, vessels and buildings should be equipped with explosion/pressure relief valves, panels and windows. Precautions must also be taken to prevent water leakage or seepage which could contact the powder. Refer to NFPA 651. Avoid all ignition sources. Good housekeeping practices must be maintained. Do not use compressed air to remove settled material from floors, beams or equipment. Do not allow fines or dust to contact water, particularly in enclosed areas.

8 Exposure Controls / PPE

**Engineering Controls**

Use with adequate explosion-proof ventilation designed to handle particulates to meet the limits listed in Section
8, Exposure Guidelines.

**Personal Protective Equipment**

**Respiratory Protection**

Use NIOSH-approved respiratory protection as specified by an Industrial Hygienist or other qualified professional if concentrations exceed the limits listed in Section 8, Exposure Guidelines. Suggested respiratory protection: N95

**Eye Protection**

Wear safety glasses/goggles to avoid eye contact.

**Skin Protection**

Wear appropriate gloves to avoid direct skin contact. Wear fire resistant clothing or equivalent full-length fire resistant pants and jackets along with electrically conductive safety shoes or grounding straps. Great caution is required to avoid contact with unprotected electrical devices when wearing conductive safety shoes or grounding straps.

**Exposure Guidelines**

**A: General Product Information**

No information available for product.

**B: Component Exposure Limits**

**Aluminum (7429-90-5)**

ACGIH 10 mg/m3 TWA (metal dust)
OSHA 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

**Silicon (7440-21-3)**

OSHA 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

9 Physical and chemical properties:

**Physical State:** Solid, finely divided powder
**Appearance:** Silvery to gray color
**Boiling Point:** Not applicable
**Melting Point:** 1070-1080°F (577-582°C)
**Vapor Pressure:** Not applicable
**Solubility in Water:** Insoluble
**Specific Gravity:** See density
**Density:** Range: generally 1.1 g/cm3 (69 lb./ft.3)
**pH Level:** Not applicable
**Odor:** Odorless
**Octanol-Water Coefficient:** Not applicable
**Auto Ignition** 650°C (layered)
**LFL** 40 mg/L

10 Stability and reactivity

**Stability:** Stable under normal conditions of use, storage, and transportation as shipped.

**Conditions to Avoid**

*** Water:** Slowly generates flammable/explosive hydrogen gas and heat. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).
*** Heat:** Oxidizes at a rate dependent upon temperature and particle size.
*** Strong oxidizers:** Violent reaction with considerable heat generation. Can react explosively with nitrates (e.g., ammonium nitrate and fertilizers containing nitrate) particularly when heated.

*** Acids and alkalis:** Reacts to generate flammable/explosive hydrogen gas. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).
*** Halogenated compounds:** Many halogenated hydrocarbons, including halogenated fire extinguishing agents, can react violently with finely divided aluminum.
*** Iron oxide (rust) and other metal oxides (e.g., copper and lead oxides):** A violent thermite reaction generating considerable heat can occur. Reaction with aluminum fines and dusts requires only very weak ignition sources for initiation.
*** Iron powder and water:** An explosive reaction forming hydrogen gas occurs when heated above 1470°F (800°C).

11 Toxicological information

**Health Effects Associated with Individual Ingredients**
**Aluminum dust, fines and fumes** Low health risk by inhalation. Generally considered to be biologically inert.
**Silicon, inert dusts** Chronic overexposures: Can cause chronic bronchitis and narrowing of the airways.
**Acute Toxicity of Ingredients/Formed Compounds**
**A: General Product Information**
No information available for product.
**B: Component Analysis - LD50/LC50**
**Silicon (7440-21-3)**
Oral LD50 Rat: 3160 mg/kg
**C: Formed Compound Toxicity - LD50s/LC50s**
This material has no components listed.
**Carcinogenicity of Ingredients**
**A: Ingredient Carcinogenicity - IARC/NTP**
None of this product's components are listed by IARC or NTP.
**B: Ingredient Carcinogenicity - ACGIH**
None of this product's components are listed by ACGIH.
**Carcinogenicity of Compounds Formed During Processing**
**A: General Product Information**
No new/additional compounds are expected to be formed during processing.

12 Ecological information:
**Ecotoxicity**
**A: General Product Information:** No information available for product.
**B: Component Analysis - Ecotoxicity - Aquatic Toxicity**
No ecotoxicity data was found for this product's components.
**Environmental Fate:** No information available for product.

13 Disposal considerations
**Disposal Instructions**
Reuse or recycle material whenever possible. **Material that cannot be reused may be sent to a metals reclamation facility that is able to handle fines.** Waste material that cannot be reclaimed for metal value should be rendered non-reactive prior to disposal in an industrial landfill.
**US EPA Waste Number & Descriptions**
**A: General Product Information**
RCRA Status: Not federally regulated in the U.S. if disposed of "as is." Otherwise, characterize in accordance with applicable regulations (40 CFR 261 or state equivalent in the U.S.)
**B: Component Waste Numbers**
RCRA waste codes other than described under Section A may apply depending on use of product. Refer to 40 CFR 261 or state equivalent in the U.S.

14 Transport information
DOT
Proper Shipping Name: None
Non-Hazardous for Transport: This substance is considered to be non-hazardous for transport.
IATA
Non-Hazardous for Air Transport: Non-hazardous for air transport.

**Notes:**

(1) This material was tested by the United States Department of Interior Bureau of Mines in 1991 under UN criteria and found not to meet the definition of a hazard class 4 and does not meet the definition of any other hazard class.
(2) Standard Transportation Commodity Code STCC 33-991-19 Aluminum or Aluminum Alloy Powder, NEC applies and is required for rail shipments.
(3) The import/export HTSUS (Harmonized Tariff Schedule) subheading 7603.10.0000 Aluminum powders of nonlamellar structure applies.
(4) When "Not regulated," enter the proper freight classification, "MSDS Number," and "Product Name" on the shipping paperwork.

15 Regulatory Information

**US Federal Regulations**

**A: General Product Information**

All electrical equipment must be suitable for use in hazardous atmospheres involving aluminum powder in accordance with 29 CFR 1910.307. The National Electrical Code, NFPA 70, contains guidelines for determining the type and design of equipment and installation that will meet this requirement.

In reference to Title VI of the Clean Air Act of 1990, this material does not contain nor was it manufactured using ozone-depleting chemicals.

**B: Component Analysis**

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

**Aluminum (7429-90-5)**

SARA 313: 1.0 % de minimis concentration (dust or fume only)

**SARA 311/312 Physical and Health Hazard Categories:**

**Immediate (acute) Health Hazard:** No
**Delayed (chronic) Health Hazard:** No
**Fire Hazard:** No
**Sudden Release of Pressure:** Yes (if dust clouds are generated during processing)
**Reactive:** No

16 Other 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.