SPECIALTY MATERIALS, INC.
SAFETY DATA SHEET
Boron Nanopowder, Carbon-doped Boron Nanopowder, and Titanium-doped Boron Nanopowder

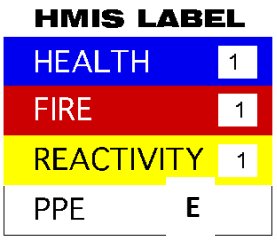
---------- *SECTION 1 – PRODUCT AND COMPANY IDENTIFICATION*----------

Product Name:	Boron Nanopowder; Carbon-doped Boron Nanopowder; Titanium-doped Boron Nanopowder
Product Use Description:	High purity nano-sized boron powder, with or without dopants, intended for conversion to magnesium diboride in subsequent processes, for use in superconducting wires
Manufacturer's Name: Address: City, State, and ZIP:	Specialty Materials, Inc. 1449 Middlesex Street Lowell, MA 01851 978-322-1900 (0800 – 1645 ET)
Emergency Telephone No.:	978-322-1927 spilioglos@specmaterials.com
Other Information:	978-322-1900
Date Prepared:	January 09, 2013

---------- *SECTION 2 – HAZARDS IDENTIFICATION*----------

Overview:

This is a high purity boron powder produced in a non-oxidizing environment. The powder has a brown-to-black appearance and a particle size in the nm range. Typical storage & handling will be in an inert atmosphere. Exposing this product to air will not result in an unstable reaction, but may impair downstream process reaction.



Classifications:

This product is classified as hazardous by definition of OSHA Hazard Communication Standard (29 CFR 1910.1200).

There is no classification data available on carcinogenic properties of this material from EPA, IARC, NTP, OSHA or ACGIH. This Product is listed with the Toxic Substance Control Act inventory and the European Inventory of Existing Commercial Substances.

Physical Hazards:

R20/22 – Harmful by inhalation and if swallowed

R36/37/38 - Irritating to eyes, respiratory system and skin

R8/9/10 – May become flammable in contact with other combustible material

Acute Health Effects:

Boron powder is irritating to the skin (H312) and eyes (H320) on contact. Harmful if swallowed (H302). Inhalation may cause irritation the lungs and mucus membrane (H332 & H335). Irritation to eyes will cause watering and redness. Reddening, scaling and itching are characteristics of skin inflammation. See Section 11 for further information.

Chronic Health Effects:

Not classifiable as a human carcinogen (ACGIH TLV-A4 and IARC-3); however, the long-term effects of ingested powders in the sub-micron range are not well understood at this time.

---------- *SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS* ----------

Composition:

90 – 99% Boron (CAS No. 7440-42-8)
0 – 10% Carbon (CAS No. 7440-40-0)
0 - 10% Titanium (CAS No. 7440-32-6)

---------- *SECTION 4 – FIRST AID MEASURES*----------

First Aid for Eyes:

If this material enters the eyes, open eyes while under gently running water. Use sufficient force to open eyelids. Have contaminated individual roll their eyes while continuing to flush with water for at least 15 minutes. Seek immediate medical attention.

First Aid for Inhalation:

Consult physician immediately. Remove contaminated clothing while preventing further spread of material. Remove individual to fresh air away from exposure. In case of irregular respiration or respiratory arrest, provide artificial respiration. Do not induce vomiting.

First Aid for Ingestion:

Consult physician immediately. Remove contaminated clothing while preventing further spread of material. Remove individual to fresh air away from exposure. In case of irregular respiration or respiratory arrest, provide artificial respiration. Do not induce vomiting.

First Aid for Skin:	In case of contact, flush affected areas with clean water. Follow-up with mild soap or similar surfactant, apply an emollient and cover. Seek immediate medical attention.

---------- *SECTION 5 - FIRE & EXPLOSION DATA* ----------

Flammability:	Slightly flammable to flammable in the presence of open flames and sparks.
Flash Points:	Not Applicable
Auto-Ignition Temperature:	MIT (^{o}C): 560, ASTM E1491
Minimum Explosible Concentration:	MEC (g/m^3): 50<MEC<60, MEC_{est} = 52, ASTM E1515
Minimum Ignition Energy:	MIE (mJ): 3<MIE<10, E_s = 7, ASTM E2019
Unusual Fire and Explosion Hazards:	The material is not explosive, but the formation of explosive dust/air mixtures may be possible (see MEC values).
Extinguishing media:	Small Fire: use dry chemical powder. Large Fire: use water spray or fog;
Special Remarks-Fire:	When amorphous boron is heated in dry ammonia, the reaction proceeds with incandescence and hydrogen is evolved. Boron also ignites when heated in members of the halogen group, resulting in incandescence at temperatures above 400^{o}C.
Special Remarks-Explosion:	Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

---------- *SECTION 6 – ACCIDENTAL RELEASE MEASURES* ----------

Steps to be Taken In Case Material Is Released or Spilled:	Utilize all recommended protective clothing and equipment (see Section 8). Clean spills in a manner that does not disperse powder dust into the air. Spill area can be washed with water. Collect wash water for approved disposal. Keep wash water from entering drains or ground water. Vacuum must be explosion-proof and HEPA-filtered for sub-micron particulate. Place all spill residue in a suitable container. Dispose of in accordance with Section 13.
Waste Disposal Method (Consult Federal, State, and Local Regulations):	OSHA classified as a hazardous material. Dispose in accordance with Federal, State and local regulations. Follow Section 14 transportation requirements.

----- *SECTION 7 – HANDLING & STORAGE* ----

This is a high purity boron powder produced in a non-oxidizing environment. Recommended storage will be in sealed containers under an inert atmosphere. Handling and/or transfer of powder to other containers should be performed in an inert atmosphere glove box. Exposing this product to air will not result in an unstable reaction; however, oxidation of the powder may impair intended downstream process reactions.

Precautions to be taken in Handling and Storage:	Store in air-tight containers enclosed with inert gas. Keep away from flame, heat and moisture.
Other Precautions:	When handling powder outside of a glove box, follow Section 8 precautions and personal protections.

-- *SECTION 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION* --

Respiratory Protection (Specify Type):	Dust respirator when transferring or manipulating this product, or if dust concentration is above threshold limit value.
Ventilation:	As per ACGIH for good quality indoor air, nuisance particulate level is 10 mg/m^3 of total dust or 5 mg/m^3 breathable dust.
Local Exhaust:	Not Applicable
Mechanical (General):	Not Applicable
Protective Gloves:	Recommended (29 CFR 1910.132) latex or nitrile gloves recommended
Eye Protection:	Recommended (29 CFR 1910.133) safety goggles recommended
Other Protective Clothing or Equipment:	Additional Protective Clothing to include Long-Sleeved Garments and Face Shield for High Sensitivity Individuals
Work/Hygienic Practices:	Wash hands thoroughly before Eating or Smoking.

---------- *SECTION 9 – PHYSICAL & CHEMICAL PROPERTIES* ----------

Physical Form:	Brown-to-black solid powder, particle size typically 0.02 to 0.1 μm
Boiling Point:	~ 3900°C
Specific Gravity (H_2O = 1):	2.32 to 2.34
Vapor Pressure (mm Hg):	Negligible
Solubility in Water:	Negligible
Reactivity in Water:	Negligible
Melting Point:	~ 2300°C

---------- *-SECTION 10 – STABILITY & REACTIVITY DATA* ----------

Stability:	Unstable ( ) Stable (**X**) at standard temperatures and pressure.
Conditions to Avoid:	Ultra-fine powders are capable of creating a dust explosion at or above a MEC of 52 and in the presence of an ignition source
Incompatibility (Materials to Avoid):	Reactive with strong oxidizing agents, strong acids and halogens.
Hazardous Decomposition Products:	None known
Hazardous Polymerization:	May Occur ( ) Will Not Occur (X)
Conditions to Avoid:	Avoid heat, spark or open flame when material is suspended in air.

---------- *-SECTION 11 –TOXICOLOGICAL INFORMATION* ----------

Health hazards are associated with short-term irritant effects on the upper respiratory tract, nasopharynx and eye.

1. Acute:	Irritating to the skin (H312) and eyes (H320) on contact. Harmful if swallowed (H302). Inhalation may cause irritation the lungs and mucus membrane (H332 & H335). Irritation to eyes will cause watering and redness. Reddening, scaling and itching are characteristics of skin inflammation.
2. Chronic:	Not classifiable as a human carcinogen (ACGIH TLV-A4 and IARC-3); however, the long-term effects of ingested powders in the sub-micron range are not well understood at this time.
Signs and Symptoms of Exposure:	Irritation of Skin or Eyes
Medical Conditions Generally Aggravated by Exposure:	Dermatitis
Emergency and First Aid Procedures:	Excessive skin contact may cause irritation. Wash affected areas with water and soap. If eye contact occurs flush with copious amounts of water.

<u>CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN</u>:

National Toxicology Program:	Yes ( ) No (**X**)
I.A.R.C. Monographs:	Yes ( ) No **(X)**
OSHA:	Yes ( ) No (**X**)
Information on Toxicity to Animals:	Acute oral toxicity (LD50): 560 mg/kg [mouse]. Acute Intra-peritoneal toxicity (LD50): 11g/kg [mouse].

---------- *-SECTION 12 –ECOLOGICAL INFORMATION* ----------

Ecological effects are not generally known at this time. EPA Code: 128945

Ecotoxicity:	Not available
Persistence and Biodegradability:	Possibly hazardous short term degradation products are not likely; however, long term degradation products may arise. The products of degradation are considered to be less toxic than the product itself.
Mobility in Soil:	Not available
Other adverse effects:	No available

---------- *-SECTION 13 – DISPOSAL CONSIDERATIONS* ----------

Waste Disposal Method	Material is a hazardous waste by definition of OSHA Hazard Communication Standard (29 CFR 1910.1200). Dispose of in accordance with Federal, State and Local Regulations. See transport information.

---------- *SECTION 14 – TRANSPORT INFORMATION* ----------

DOT Hazard Classification:	4.1
Identification Number:	UN3178
Packing Group:	III
Proper Shipping Name:	Flammable solids, inorganic, n.o.s.
IATA Classification:	4.1
Identification Number:	UN3178
Packing Group:	III
Proper Shipping Name:	Flammable solids, inorganic, n.o.s.

---------- *SECTION 15 – REGULATORY INFORMATION* ----------

OSHA:

This product is classified as hazardous under the criteria of OSHA Hazard Communication Standard (29 CFR 1910.1200).

Federal and State Regulations:

TSCA 8(b) inventory: Boron

There is no classification data available on carcinogenic properties of this material from EPA, IARC, NTP, OSHA or ACGIH. This Product is listed with the Toxic Substance Control Act inventory and the European Inventory of Existing Commercial Substances.

---------- *SECTION 16 – OTHER INFORMATION* ----------

SDS history:

Date of Issue: 09 January, 2013

Version: B

NOTICE:

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