

Safety Data Sheet



1. Identification of the Substance/Mixture and the Supplier

Supplier : National Institute of Advanced Industrial Science and Technology (AIST)
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ID Number : 5208001

Identity of Substance/Mixture : Certified Reference Material NMIJ CRM 5208-a
Au/Ni/Cu Multiple Layer Film
Recommended Use of the Chemical and Restriction on Use : This reference material can be used in controlling the precision of analysis, or adjusting the measurement conditions, during area density and film thickness analysis by an X-ray Fluorescence (XRF) spectrometer. Do not use this reference material for other purposes than testing/research.

2. Hazards Identification

GHS classification : Not classifiable
GHS label element : -
Signal word : -
Hazard and toxicity : -
Other Hazards Statement : May cause incised wound by the edge. If broken, the broken fractions may be scattered and their dust may be got in eyes.
Precautionary Statement : [Safety Precaution]
Use personal protective equipment.
[First-Aid Measure]
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if presents and easy to do. Continue rinsing. If eye irritation persists, seek medical examination/treatment.
If on skin: Rinse skin with plenty of water.
If swallowed: Do not induce vomiting. Seek medical examination/treatment.
[Storage]
Store in the nitrogen ambience at a temperature between 5°C and 35°C.
[Disposal]
Dispose of this reference material in accordance with applicable

legislation and local government ordinance.

Entrust disposal of this reference material to a professional waste disposal company licensed by prefectural governor.

The other hazards than the above do not result in classification or are not classifiable.

3. Composition/Information on Ingredients

Substance or mixture	:	Mixture
Chemical name	:	Silicon
Synonym	:	-
Chemical formula	:	Si
Molecular weight	:	28.09
CAS number	:	7440-21-3
Content	:	99 % or above
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : - Industrial Safety and Health Act : -

※ The structure of the reference material: This reference material is a multilayer Au/Ni/Cu film. On top of the Si substrate, chromium, copper, nickel and gold films are grown in this order. Thickness of each film is as follows: about 10 nm equivalent for the Cr film, about 100 nm for the Au film, about 1000 nm for the Ni film and about 1000 nm for the Cu film.

4. First-aid Measures

If inhaled	:	In the normal use as a reference material, risk of inhalation is limited. If scattered fractions, dust or mist, etc., which are generated when this reference material is broken, cut or polished, etc., are inhaled, however, there may be harmful effects. In such case, remove victim to fresh air and keep at rest in a position comfortable for breathing. Seek medical examination/treatment as required.
If on skin	:	In the normal conditions of use as a reference material, this reference material poses no problem. If experiencing symptoms, however, seek medical examination/treatment as required.
If in eyes	:	If scattered fractions or dusts, which are generated when this reference material is broken, are got into eyes, rinse thoroughly with clean water. Seek medical examination/treatment as required.
If swallowed	:	Do not induce vomiting. Seek medical examination/treatment.
The Most Critical Characteristics and Symptoms of Expected Acute Symptoms and Delayed Symptoms	:	In the normal conditions of use as a reference material, this reference material poses no problem. If dust or mist, etc., which are generated when this reference material is broken, cut or polished, etc., are in contact with eyes or mucous membranes, however, irritating effects occur.
Protection of First-Aid	:	Use personal protective equipment.

Responder

5. Fire-fighting Measures

- Extinguishing Media : Use dry chemical extinguisher and dry sand. Do not use water or water-based extinguishing media.
- Fire-Specific Hazards : This reference material, if in the form of powder, is flammable and may cause dust explosion. This reference material, if in the form of powder, reacts with water to release flammable or explosive gases. If in the form of lump, it is nonflammable.
- Specific Fire-Fighting Method : Eliminate ignition sources at the origin of a fire and put out fire by using appropriate extinguishing media. Remove movable containers promptly to a safe place. In the case of immovable containers, cool their surroundings with sprayed water.
- Protection of Fire-Fighters : Carry out fire-fighting from the windward in order to avoid breathing hazardous gas. Use personal protective equipment such as fireproof clothing, heat-resistant clothing, protective clothing, compressed air open-circuit self-contained breathing apparatus, compressed oxygen closed-circuit self-contained breathing apparatus, rubber gloves and rubber boots.

6. Accidental Release Measures

- Personal Precaution : In the normal conditions of use as a reference material, risk of accidental release is limited.
Remove potential ignition sources from the vicinity promptly as this reference material, if in the form of powder, is flammable.
Make fire-fighting kit available to be prepared for potential ignition.
- Personal Protective Equipment and Emergency Procedures : Ventilate the affected areas thoroughly, if it is in an indoor environment, until the clean-up operation is completed.
Use appropriate personal protective equipment during the operation to avoid skin contact of splash, etc. and inhalation of dust and gas.
- Environmental Precautions : In the normal conditions of use as a reference material, risk of accidental release is limited. Take precautions, however, to prevent spillage from draining into rivers etc. to adversely impact the environment. Make it sure to appropriately treat contaminated wastewater in order to prevent untreated wastewater from being released into the surrounding environment.
- Recovery, neutralization : -
- Measures to prevent secondary accident : -

7. Handling and Storage

- Handling
Engineering
Precautions

- How to take out a sample : Wash tools such as tweezers thoroughly in advance. Take a sample in as clean environment as possible such as in a clean booth. Do not touch an area to be measured.
 - How to return a sample : Return a sample by using tools such as tweezers in as clean environment as possible just like when it is taken.
 - Local and General Ventilation : There is no need to use local ventilation system, etc. in normal conditions of use as a reference material.
 - Precautions for Safe Handling : Avoid rough handling such as turning over, dropping, giving a shock to or dragging containers.
Take precautions to prevent scattering, etc.
Keep container tightly closed after use.
Wash hands, face, etc. thoroughly and gargle after handling this reference material.
Restrict drinking, eating and smoking to designated areas.
Do not bring gloves and other contaminated personal protective equipment into staff room.
Make a place handling this reference material a restricted area to keep out unauthorized people.
Use appropriate personal protective equipment to avoid inhalation and contact with eyes, skin and clothing.
 - Storage
 - Appropriate Storage Conditions : Store away from direct sunlight. Store in the nitrogen ambience at a temperature between 5 °C and 35 °C.
 - Safe Container : Fluororesin container
 - Packaging Material
- ※ See the Certificate for the details on appropriate storage conditions and instructions for use as a reference material.

8. Exposure Controls/Personal Protection

Threshold Limit Value

Not specified

Permissible Concentration (Si)

- ACGIH TLV-TWA : 10 mg/m³
- Values recommended by Japan Society for Occupational Health : 2 mg/m³ (Respirable fraction)
8 mg/m³ (Total dust)
- OSHA PEL TWA : 8H TWA 15 mg/m³ (Total dust)
8H TWA 5 mg/m³ (Respirable fraction)

Engineering Controls

- Ventilation/Exhaust : Local ventilation system or General ventilation system
- Safety Control/ Gas Detection : Measuring equipment, Detecting tube
- Storage Precaution : Store away from direct sunlight. Store in a dry place.

Personal Protective Equipment (PPE)

- Respiratory System : Dust mask (If dust is generated)
- Hands : Protective gloves
- Eyes : Eye protection
- Skin and Body : Protective clothing, Face protection

Hygiene Controls

Handle this reference material in accordance with industrial health and safety standards.

9. Physical and Chemical Properties

- Appearance, etc. : Solid
- Color : Dark gray
- Odor : Odorless
- pH : No data
- Melting point : 1410 °C (Si)
- Boiling point : 2355 °C (Si)
- Flashing point : No data
- Explosive range : No data
- Vapor pressure : No data
- Relative vapor density(Air=1) : No data
- Specific gravity or bulk specific gravity : 2.33 g/cm³ (Si)
- Solubility : Soluble in aqua regia, nitric acid including hydrogen fluoride, sodium hydroxide
- *n*-Octanol/water partition coefficient (Log *P*_{o/w}) : No data
- Auto-ignition temperature : No data
- Decomposition temperature : No data
- Flammability : No data

10. Stability and Reactivity

- ◇Stability
 - Stable in normal storage conditions
- ◇Reactivity
 - No data
- ◇Possibility of hazardous reactions
 - Reacts with oxygen at 400 °C or higher and nitrogen at 1000 °C or higher to produce silicon oxide and silicon nitride.
 - Reacts with water at a high temperature to release explosive hydrogen gas
 - Dissolved in aqua regia, nitric acid containing hydrogen fluoride and sodium hydroxide.
- ◇Conditions to Avoid
 - Sunlight, Heat, Moisture
- ◇Incompatible Substance
 - Strong oxidizer
- ◇Hazardous Decomposition Products
 - No data available

11. Toxicological Information

(as Si)

Acute Toxicity	Oral Rat LD50=3160 mg/kg
Serious Eye Damage/ Eye Irritation	Mild eye irritation observed in the test using rabbits
Specific target organ toxicity/Systemic toxicity (Single exposure)	It was reported that 25 mg administration through airway to rabbits caused lesion in pulmonary epithelium.
Specific target organ toxicity/Systemic toxicity (Repeated exposure)	It was reported that dogs and rats, to which this reference material was administered with feed at 800 mg/kg/day for one month, did not develop any toxic symptoms or tissue changes. There are no data available for administration with other routes.

Others

- ※ The above toxicological information is prepared based on the information on the raw materials since there is no information on the mixture available.
Under the normal conditions, this reference material is stable and it does pose a risk for elution of hazardous additive components. In the case of special handling, such as use at a high temperature, however, thorough safety precautions must be taken.

12. Ecological Information

Toxicity

- No data available

Persistence and Degradability

- No data available

Bioaccumulative Potential

- No data available

Mobility in soil

- No data available

Ozone depletion potential

- No data available

13. Disposal Considerations

Residual Waste	: Landfill disposal Dispose of this reference material in accordance with applicable legislation and local government ordinance. When the above-mentioned treatments are not possible, entrust disposal of residual waste to a professional waste disposal company licensed by prefectural governor.
Contaminated Container and Package	: Dispose of containers after thoroughly removing their contents.

14. Transport Information

UN number	: 3146
UN classification	: Class 4.1
Material name	: Silicon

Container grade : PG III
ICAO/IATA : Not applicable
Marine pollutant : Not applicable
Precautions : Avoid direct sunlight, pay attention to leaks due to falling, overturning, etc. and flames carefully. Transport this reference material carefully.

15. Regulatory Information

• No applicable laws and regulations

- ◎ **This SDS is originally prepared for the use of the material in Japan, thus the stated laws and regulations are stipulated and carried out in Japan. The use of the material in other countries should be referred to and by application of the relevant laws and regulations of the country in which the material will be used.**
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16. Other Information

Others

The information in this document is not intended to be exhaustive and is based on currently available information and data. The measures given in this document are applicable only to normal handling conditions. When handling this reference material under special conditions etc., it is recommended to take safety measures appropriate to each specific application and context of use. This document is intended to provide information and not intended to guarantee anything in handling this reference material.
