

## SAFETY DATA SHEET

### SECTION 1 – IDENTIFICATION

|  |  |
|--|--|
| Product Identifier                                       | Faraday Rotator GMF  |
| Product Name   | Substituted Rare-earth Iron Garnet single crystals (RIG)         |
| Manufacturer/Supplier                                    | GRANOPT CO.,LTD  |
| Address  | 4-4, Ougibuchi, Aza, Ougida, Noshiro-shi, Akita, 016-0122, Japan |
| Division   | Quality Assurance Sect.  |
| Phone  | +81-185-70-1800  |
| Fax  | +81-185-70-1803  |
| Created Date   | Jul. 2, 2013   |
| Revised Date   | Dec. 1, 2024   |
| Recommended use of the product<br>and restriction on use | Optical components for optical communication equipment etc.      |

### SECTION 2 – HAZARDS IDENTIFICATION

#### GHS Classification

|                       |  |
|-----------------------|--|
| Health hazards        | Specific target organ toxicity (single exposure) / Category 1<br>(Respiratory system, Nervous system, Kidneys, Osteoarticular)<br>Specific target organ toxicity (repeated exposure) / Category 1<br>(Respiratory system, Nervous system, Kidneys, Osteoarticular)<br>Hazards not stated here are “Not applicable” or “Classification not possible”. |
| Environmental hazards | Classification not possible  |

#### GHS label

##### Symbols



|                   |  |
|-------------------|--|
| Signal words      | Danger   |
| Hazard statements | Causes damage to organs (Respiratory system, Nervous system, Kidneys, Osteoarticular) (Inhalation)<br>Causes damage to organs (Respiratory system, Nervous system, Kidneys, Osteoarticular) through prolonged or repeated exposure |

(Inhalation)

Precautionary statements

- [Prevention] Do not breathe dust/fume/gas/mist/vapors/spray.  
 Wash hands thoroughly after handling.  
 Do not eat, drink or smoke when using this product.
- [Response] IF exposed or concerned: Get emergency medical help immediately.  
 Get medical help if you feel unwell.  
 Specific treatment (see reference to supplemental first aid instruction on this document).
- [Storage] Store Locked up.  
 Store at room temperatures and room humidity.
- [Disposal] Dispose of contents and container in accordance with all local, regional, national and international regulations.

SECTION 3 – COMPOSITION/INFORMATION OF INGREDIENTS

Classification of the substance or mixture      Mixture

Composition table

| Chemical name or generic name | Concentration | Chemical property              | Reference number in gazetted list in Japan |          | CAS No.    |
|-------------------------------|---------------|--------------------------------|--|----------|------------|
|                               |               |                                | METI No. (ENCS No.)                        | ISHL No. |            |
| Diiron trioxide               | 33%           | Fe <sub>2</sub> O <sub>3</sub> | (1)-357,<br>(5)-5188                       | 192      | 1309-37-1  |
| Bismuth oxide                 | 60.6%         | Bi <sub>2</sub> O <sub>3</sub> | (1)-98                                     | None     | 1304-76-3  |
| Rare earth oxide              |               | RE <sub>2</sub> O <sub>3</sub> | Proprietary                                |          |            |
| Gallium oxide                 | 6.3%          | Ga <sub>2</sub> O <sub>3</sub> | (1)-695                                    | None     | 12024-21-4 |
| Lead monoxide                 | < 0.1%        | PbO                            | (1)-527                                    | 411      | 1317-36-8  |

Impurity and stabilization additive of contributing

No information available.

Information as the mixture

This product is classified as a mixture, but it is equivalent to a single compound which consists of compounds listed in the components table. The product does not demonstrate properties which are inherent to each component on its own, or each components does

not elute (from the product).

#### SECTION 4 – FIRST-AID MEASURES

|              |   |
|--------------|---|
| Inhalation   | Remove to fresh air and keep at rest in a position comfortable for breathing.<br>Call a POISON CENTER or doctor/physician.  |
| Skin contact | Wash with soap and water.<br>Remove/Take off immediately all contaminated clothing.<br>Wash contaminated clothing before reuse.<br>Call a POISON CENTER or doctor/physician if you feel unwell. |
| Eyes contact | Rinse cautiously with water for several minutes.<br>Remove contact lenses, if present and easy to do.<br>Continue rinsing.<br>Call a POISON CENTER or doctor/physician.                         |
| Ingestion    | Rinse mouth.<br>Call a POISON CENTER or doctor/physician if you feel unwell.  |

#### SECTION 5 – FIRE-FIGHTING MEASURES

|  |  |
|--|--|
| Suitable extinguishing media                                   | No information available.  |
| Special protective equipment and precautions for fire-fighters | Wear proper protection. Use Self-Contained Breathing Apparatus (SCBA), chemical protective clothing. |

#### SECTION 6 – ACCIDENTAL RELEASE MEASURES

|  |   |
|--|---|
| Personal precautions (protective equipment and emergency measures) | Handling person should wear suitable protective equipment as indicated in SECTION 8 (EXPOSURE CONTROL/PERSONAL PROTECTION). Avoid contact with eye or skin. Avoid breathing gas.  |
| Collection and neutralization                                      | Vacuum up or sweep up spillage and collect in suitable container for disposal.<br>Absorb the leakage with inert material (e.g. dry sand, soil, etc.,) and collect in a container for disposal of chemical product.<br>Scoop up or use appropriate absorber to remove from the water surface. Do not use dispersant. |
| Methods and materials for containment and cleaning up              | Substance is to solidify and gather up.   |

After eliminating, clean completely contaminated area with water

SECTION 7 – HANDLING AND STORAGE

Handling

Technical measures                      Take equipment measures and wear suitable protective equipment as indicated in SECTION 8 (EXPOSURE CONTROL/PERSONAL PROTECTION).

Total or local exhaust ventilation                      Use total or local exhaust ventilation as indicated in SECTION 8 (EXPOSURE CONTROL/PERSONAL PROTECTION).

Precautions for safe handling                      Avoid contact with eyes and skin.  
 Do not eat, drink or smoke when using this product.  
 Wash hands thoroughly after handling.  
 Avoid ingestion.  
 Avoid contact with skin.  
 Use outdoors or in a well-ventilated place.  
 Avoid breathing dust/fume.  
 Use exhaust ventilation to keep the atmospheric concentration below the occupational exposure limits.

Prevention of Contact                      Refer to SECTION 10 (STABILITY AND REACTIVITY).

Storage

Incompatible materials                      Refer to SECTION 10 (STABILITY AND REACTIVITY).

Storage conditions                      Store at normal temperatures and normal humidity.

Safe packaging materials                      No information available.

SECTION 8 – EXPOSURECONTROLS/PERSONAL PROTECTION

Administrative level, Occupational exposure limits

|                 | Administrative level     | Japan Society for Occupational Health  | ACGIH                    |
|-----------------|--------------------------|--|--------------------------|
| As products     | No information available | No information available   | No information available |
| Diiron trioxide | Not established          | [Dust occupational exposure limits]<br>(Class 2 dust)<br>Respirable dust 1 mg/m <sup>3</sup><br>Total dust 4 mg/m <sup>3</sup> | TWA 5 mg/m <sup>3</sup>  |
| Bismuth oxide   | Not established.         | Not established.   | Not established.         |
| Gallium oxide   | Not established.         | Not established.   | Not established.         |



|  |  |
|--|--|
| Acute toxicity (dermal)                            | Not classified.  |
| Acute toxicity (inhalation gas)                    | Not classified. (Classified as “solid” according to GHS definition.)     |
| Acute toxicity (inhalation vapor)                  | Not classified.  |
| Acute toxicity (inhalation dust/mist)              | Not classified.  |
| Skin corrosion/irritation                          | Not classified.  |
| Serious eye damage/eye irritation                  | Not classified.  |
| Respiratory or skin sensitization                  | Not classified.  |
| Germ cell mutagenicity                             | Not classified.  |
| Carcinogenicity                                    | Not classified.  |
| Reproductive toxicity                              | Not classified.  |
| Specific target organ toxicity (single exposure)   | Category 1 (Respiratory organs, Nervous system, Kidneys, Osteoarticular) |
| Specific target organ toxicity (repeated exposure) | Category 1 (Respiratory organs, Nervous system, Kidneys, Osteoarticular) |
| Aspiration hazard                                  | Classification not possible.   |

As Diiron trioxide

|                                       |  |
|---------------------------------------|--|
| Acute toxicity (oral)                 | Classification not possible.   |
| Acute toxicity (dermal)               | Classification not possible.   |
| Acute toxicity (inhalation gas)       | Not classified. (Classified as “solid” according to GHS definition.) |
| Acute toxicity (inhalation vapor)     | Classification not possible.   |
| Acute toxicity (inhalation dust/mist) | Not classified.  |
| Skin corrosion/irritation             | Not classified.  |
| Serious eye damage/eye irritation     | Not classified.  |
| Respiratory or skin sensitization     | Classification not possible.   |
| Germ cell mutagenicity                | Not classified.  |
| Carcinogenicity                       | Classification not possible.   |

Reproductive toxicity Classification not possible.  
Specific target organ toxicity (single exposure)  
Category 1 (Respiratory organs)  
Specific target organ toxicity (repeated exposure)  
Category 1 (Respiratory organs)  
Aspiration hazard Classification not possible.

As Bismuth oxide

Acute toxicity (oral) Classification not possible. "See other hazard data of bismuth compound as well."  
Acute toxicity (dermal) Classification not possible.  
Acute toxicity (inhalation gas) Not Classified. (Classified as "solid" according to GHS definition.)  
Acute toxicity (inhalation vapor)  
Classification not possible.  
Acute toxicity (inhalation dust/mist)  
Classification not possible.  
Skin corrosion/irritation Classification not possible.  
Serious eye damage/eye irritation  
Classification not possible.  
Respiratory or skin sensitization  
Classification not possible.  
Germ cell mutagenicity Classification not possible.  
Carcinogenicity Classification not possible.  
Reproductive toxicity Classification not possible.  
Specific target organ toxicity (single exposure)  
Category 1 (Nervous system, Kidneys, Osteoarticular): It was reported that common toxic effects that were attributed to bismuth and bismuth compounds in humans are encephalopathy, nephropathy, osteoarthropathy, gingivitis, stomatitis and colitis, and inorganic bismuth compounds cause neurotoxicity (PATTY (5th, 2001)). Additionally, there is a report that clinical manifestations of acute bismuth intoxication are similar to those caused by mercury and lead: neurological abnormalities which include encephalopathy, and renal dysfunction with nephrotic syndrome (PATTY (5th, 2001)).  
Specific target organ toxicity (repeated exposure)  
Category 1 (Nervous system, Kidneys, Osteoarticular): Since it was

reported that common toxic effects that were attributed to bismuth and bismuth compounds in humans are encephalopathy, nephropathy, osteoarthropathy, gingivitis, stomatitis and colitis, and inorganic bismuth compounds cause neurotoxicity (PATTY (5th, 2001)). In addition, there is a report that the symptoms of chronic toxicity in humans consist of decreased appetite, rheumatic pain, diarrhea, fever, foul breath, gingivitis and dermatitis (HSDB (2002)).

Aspiration hazard Classification not possible.

As Gallium oxide

Acute toxicity (oral) Not classified.

Acute toxicity (dermal) Not classified.

Acute toxicity (inhalation gas) Not classified.

Acute toxicity (inhalation vapor) Not classified.

Acute toxicity (inhalation dust/mist)  
Not classified.

Skin corrosion/irritation Not classified.

Serious eye damage/eye irritation  
Not classified.

Respiratory or skin sensitization  
Not classified.

Germ cell mutagenicity Not classified.

Carcinogenicity Not classified.

Reproductive toxicity Not classified.

Specific target organ toxicity (single exposure)  
Not classified.

Specific target organ toxicity (repeated exposure)  
Not classified.

Aspiration hazard Not classified.

SECTION 12 – ECOLOGICAL INFORMATION

As product

Hazardous to the aquatic environment: Short term (Acute)  
No information available.

Hazardous to the aquatic environment: Long term (Chronic)  
No information available.

Hazardous to the ozone layer No information available.

As Diiron trioxide

Environmental hazards

Hazardous to the aquatic environment: Short term (Acute)  
Classification not possible.

Hazardous to the aquatic environment: Long term (Chronic)  
Classification not possible.

Hazardous to the ozone layer Classification not possible.

As Bismuth oxide

Environmental hazards

Hazardous to the aquatic environment: Short term (Acute)  
Classification not possible.

Hazardous to the aquatic environment: Long term (Chronic)  
Classification not possible.

Hazardous to the ozone layer Classification not possible: This substance is not listed in Annexes to the Montreal Protocol.

### SECTION 13 – DISPOSAL CONSIDERATIONS

Residual waste Lower hazard level as much as possible before disposal by detoxification, stabilization or neutralization processing.  
Waste disposal should be in accordance with existing federal, state and local environmental control laws.  
Entrust disposal to officially recognized expert traders or disposal dealers with the permission of the prefectural governor, or entrust to local public entities if they are dealing disposal.  
Entrust disposal by notifying dangerous and hazardous information thoroughly to a waste disposal dealer.  
Waste material categorized as “Special designated hazardous industrial waste” of “Special Control Industrial Waste” should be disposed in accordance with applicable and related regulation.  
Avoid direct release to the rivers, etc. landfill or disposal of the effluent and washing water containing this product.

Including contaminated containers and packaging

Recycle used containers by cleaning or dispose appropriately in

accordance with official regulation.

Dispose of empty container after elimination contents completely.

#### SECTION 14 – TRANSPORT INFORMATION

##### International regulations

|                                 |                 |
|---------------------------------|-----------------|
| Marine regulation               | Not applicable. |
| UN Number                       | Not applicable. |
| Marine Pollutant                | Not applicable. |
| Aviation regulation information | Not applicable. |
| UN Number                       | Not applicable. |

#### SECTION 15 – REGULATORY INFORMATION

##### International regulation

Directive Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Compliant.

Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Not applicable.

The Toxic Substances Control Act (TSCA), PBT substances

Not applicable.

Regulatory information with regard to this product in your country or region should be examined by your own responsibility.

#### SECTION 16 – OTHER INFORMATION

##### Hazardous Materials Identification System (HMIS)

|                     |   |
|---------------------|---|
| Health              | 2 |
| Fire                | 0 |
| Reactivity          | 0 |
| Personal Protection | – |

Reference  
GHS Classification Results by the Japanese Government (FY2019)  
GHS Classification Guidance for the Japanese Government revised edition (Ver.1.1) (GHS 4th edition, JIS Z 7252:2014)

The information in this SDS was obtained from current and reputable sources, data and information. However, composition content, physical and chemical property, danger and hazard information data are

it may be updated based on the new scientific finding and test data etc.. As cautions described are for normal usage, and it is assumed any chemical product has unknown hazard, extreme caution is required for handling. It is the user's responsibility to determine safe conditions for use of this product. For special handling, please use it in the light of suitable safety measures for application and usage.

End of Document.

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