EnyGy® Graphene-Based Electrode Films for Ultracapacitors
Safety Datasheet

1 IDENTIFICATION

1.1 Product Identifier

Product Name — Graphene-based electrode films for ultracapacitors

Product Number	10004
Brand	EnyGy

1.2 Other means of identification

Carbon electrode, graphene electrode

1.3 Recommended use of the chemical and restrictions on use

Manufacture of ultracapacitors

1.4 Details of supplier

Company details

EnyGy Ltd
6/45-53 Duerdin St
Notting Hill VIC 3168
Australia

Telephone	+ 61 425 254 882
Email	yufei.wang@enygy.com

1.5 Emergency phone number

enyGy contact	+61 425 254 882
Poisons Information Centre	13 11 26

2 HAZARDS IDENTIFICATION

2.1 Classification of hazardous chemical

Not classified as hazardous according to GHS

Contains engineered/manufactured nanomaterials. Caution: *Hazards not fully characterized*

2.2 Label elements, including precautionary statements

Pictogram	Not applicable
Signal word	Not applicable
Hazard statement(s)	Not applicable
Prevention – Precautionary statement(s)	Not applicable
Response– Precautionary statement(s)	Not applicable
Storage – Precautionary statement(s)	Not applicable
Disposal – Precautionary statement(s)	Not applicable

2.3 Other information

The components of this substance have been classified as non-hazardous but practical experience has shown slight staining to occur if rubbed. Take general precautions when using and avoid direct contact with skin. Do not try to damage the film and avoid dust formation as it poses an inhalation risk and an increased flammability risk.

3 COMPOSITION AND INFORMATION ON INGREDIENTS

Substance	Graphene-based electrode on aluminium substrate
Description	Graphene-based active materials with additives.

Components

Full details of ingredients are not disclosed as they contain commercially confidential information. This is in accordance with Schedule 8 of the WHS Regulations (disclosure of ingredients), where the undisclosed ingredient(s) is not classified as hazardous and has no established exposure standard.

4 FIRST AID MEASURES

4.1 Description of first aid measures

General advice	▪ Move person away from contamination area if safe to do so. Wear gloves and appropriate PPE to prevent further contamination
In case of skin contact	▪ Remove all contaminated clothing ▪ Flush skin and hair with running water, soap is recommended ▪ Seek medical attention if irritation occurs
In case of eye contact	▪ Flush eyes immediately with fresh running water ▪ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye by occasionally lifting the upper and lower eyelids ▪ Seek medical attention ▪ Remove contact lenses if easy to do so. Otherwise this should be undertaken by skilled personnel
If inhaled	▪ Move person to fresh air, away from contaminated area ▪ Lay patient down and keep them warm, calm and rested ▪ Prothesis such as false teeth should be removed prior to first aid procedures ▪ Apply artificial respiration if not breathing ▪ Transport to hospital or doctor
If ingested	▪ Rinse mouth with water and then give a glass of water ▪ First aid generally not required but if doubt, call Poisons Information Centre or a doctor

4.2 Symptoms caused by exposure

The most important known symptoms are described on label and Section 2. Also beware of the staining ofclothing and contact surfaces.

4.3 Medical attention and special treatment

No data available.

5 FIREFIGHTING MEASURES

5.1 Suitable extinguishing equipment

As with most organic solids, fire is possible at elevated temperatures or in contact with ignition source. If this occurs, use agent most appropriate to extinguish fire in local area. This can include water spray, foam, dry chemical powder, CO_2 etc.

5.2 Specific hazards arising from the chemical

Combustion products include carbon monoxide (CO) and carbon dioxide (CO_2). No data available on otherdecomposition products.

5.3 Special protective equipment and precautions for firefighters

Wear self-contained breathing apparatus for firefighting where necessary. Avoid contamination withoxidizing agents (i.e. nitrates, oxidizing acids, chlorine bleaches etc.) as ignition can occur.

6 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment, and emergency procedures

Avoid generating any dust when using (ie: from cracking, rubbing or delaminating the electrode from the substrate). If powder is generated unintentionally, avoid breathing in vapours, ensure adequate ventilation. Wear personal protective equipment such as gloves and safety glasses when handling to avoidskin and eye contact. See Section 8 for more details.

6.2 Environmental precautions

Do not allow material to enter drains.

6.3 Methods and materials for containment and cleaning up

Sweep up any waste material and keep in suitable closed container for disposal.

7 HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid personal contact and use in a well-ventilated area. Wear gloves when handling and do not rub or damage the electrode as carbon dust may be generated. If dust is generated, work in a fumehood or wearan appropriate particulates mask. DO NOT INGEST.

7.2 Conditions for safe storage, including any incompatibles

- When opening the package (box) and removing the vacuum-sealed bag, inspect the bag thoroughly. If the bag does not appear appropriately sealed or shows any signs of damage or tearing, the product is compromised and may not perform as expected.
- Store the product within a vacuum-sealed bag or enclosure at all times.
- Maintain the vacuum-sealed product at room temperature with a humidity level below 60% RH.
- Do not exceed a storage duration of 12 months under the specific conditions (points 2 and 3 above). Ideally, initiate the handling process and supercapacitor assembly early within this timeframe.
- Upon removal from the vacuum-sealed enclosure, utilize the product within 72 hours.
- Throughout this 72-hour handling period, avoid exposure to direct sunlight, moisture, temperature fluctuations, and extreme temperatures, as well as contaminants such as dust, dirt, and oils. Therefore, ensure the product is handled:
    - with gloves to prevent contamination;
    - in a clean environment free from dust, dirt, and other contaminants;
    - in a low humidity environment (avoid exposing it to water or humidity because moisture can degrade the performance of the electrode films);
    - under constant room temperature (excessive heat or cold can impact the conductivity and stability of the materials, leading to diminished performance or even damage, and rapid temperature fluctuations can cause stress on the electrode films and lead to mechanical failure or delamination), and;
    - Refrain from subjecting the product to any cleaning processes before use.
- During this 72-hour handling period, undertake supercapacitor assembly in a dry room (environments with controlled moisture and oxygen levels to minimize the risk of degradation and ensure optimal performance and longevity).
- Any unused film must be thoroughly dried and promptly returned to a vacuum-sealed environment within the 72-hour handling period for future use (while adhering to storage conditions mentioned in points 2-4) or disposed of properly.
- For any questions or concerns regarding the handling, storage, or use of our electrode films, please contact our technical support team at support@enygy.com.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

8.1 Control parameters

We are unaware of any exposure limits or standards.

8.2 Engineering controls

Use in a well-ventilated area and adhere to general industry hygiene practice.

8.3 Personal protective equipment

Eye and face protection	Use eye protection such as safety glasses as recommended by the appropriate government standards (AS/NZS 1336, AS/NZS 1337).
Skin protection	Handle with gloves at all times, inspect gloves for holes and damage prior to use. Use proper glove removal technique to avoid touching skin with this product.

Inhalation protection	Respiratory protection not required, if film is damaged and generates particulates, wear a particulates mask (P2 or equivalent) or work in a fumehood.

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Basic physical and chemical properties

Appearance	Black film on aluminium substrate
Odour	No data available
Odour threshold	No data available
pH	No data available
Melting/freezing point	No data available
Boiling point & boiling range	No data available
Flash point	No data available
Evaporation rate	No data available
Flammability (solid, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	No data available
Vapour density	No data available
Relative density	No data available
Solubility (H_2O)	Miscible
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available

9.2 Additional physical/chemical information

The carbon material may become flammable at elevated temperatures and on exposure to ignitionsources.

10 STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable at room temperature in closed containers and normal storage and handling conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Avoid ignition sources if slurry is dried completely.

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Combustion products include carbon monoxide (CO) and carbon dioxide (CO_2). No data available on other decomposition products.

11 TOXICOLOGICAL INFORMATION

11.1 Toxicological effects

Acute toxicity	No data available
Skin corrosion/irritation	Practical experience predicts that slight skin irritation or inflammation may occur in some individuals after direct contact.Skin contact should not have harmful health effects though beware of entry through open wounds, lesions or abrasions.
Serious eye damage/irritation	No data available
Respiratory or skin sensitisation	No data available
Germ cell mutagenicity	No data available
Carcinogenicity	No data available
Reproductive toxicity	No data available
Specific target organ toxicity – single exposure	No data available
Specific target organ toxicity – repeated exposure	No data available
Aspiration hazard	No data available

11.2 Information on possible routes of exposure

Skin and eye contact represents the most common possible routes of exposure. Beware of touching eyes/face with contaminated gloves. Inhalation risks are low due to the chemical being in a solid form but be aware of dust if electrode is broken or cracked.

11.3 Early onset symptoms related to exposure

Skin and eye irritation

11.4 Delayed health effects from exposure

No data available

11.5 Exposure levels and health effects

No data available

11.6 Interactive effects

No data available

12 ECOLOGOICAL INFORMATION

12.1 Ecotoxicity

No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Other adverse effects
No data available

13 DISPOSAL CONSIDERATIONS

13.1 Safe handling and disposal methods
Dispose of unused material to a licensed chemical disposal company in a suitable, inert container with atightly closed lid and contents clearly labelled. Avoid damaging/cracking the film and generating dust, if absolutely necessary, wear a particulates mask (P2 or higher) or conduct work in a fumehood.

13.2 Disposal of any contaminated packaging
Wash/sweep out residual material and collect waste in inert container for disposal. The rinsed container can be dried and disposed of as unused product.

13.3 Environmental regulations
No data available

14 TRANSPORT INFORMATION

UN number	No data available
Proper shipping name or Technical name	Graphene-based electrode for ultracapacitors
Transport hazard class	No data available
Packing group	No data available
Environmental hazards	No data available
Special precautions for user	No data available
Additional information	No data available
Hazchem or emergency action code	No data available

15 REGULATORY INFORMATION

15.1 Safety, health and environmental regulations
Standard for the Uniform Scheduling of Medicines and Poisons:
No data available

16 OTHER INFORMATION

This information is prepared by enyGy from in-house testing and expertise and the aid of information from:

- ChemWatch Review SDS
- MTI Corporation SDS
- Safework Australia - Preparation of safety data sheets for hazardous chemicals: Code of Practice
- SDS from relevant materials supplier

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