

## MATERIAL SAFETY DATA SHEET

### Section 1. Chemical Product And Company Identification

Product Name :	Superior Lithium Polymer Battery(SLPB)
Battery Type :	Rechargeable Battery
Description :	Lithium Cobalt Dioxide Chemistry or Lithium Cobalt Manganese Nickel Oxide
Model :	SLPB Series
Electrochemical System :	Negative Electrode : Carbon Positive Electrode : Lithium Cobalt Dioxide (LiCoO <sub>2</sub> ) Lithium Cobalt Manganese Nickel Oxide (LiMnNiCoO <sub>2</sub> ) Electrolyte : Solution of lithium hexafluorophosphate (LiPF <sub>6</sub> ) in a mixture of organic solvent _ Ethylene Carbonate(EC) + Ethymethyl Carbonate(EMC) Nominal Voltage : 3.7V
Overall Chemical Reaction :	Li <sub>x</sub> C + Li <sub>1-x</sub> ↔ C + LiCoO <sub>2</sub> Li <sub>x</sub> C + Li <sub>1-x</sub> ↔ C + LiMnNiCoO <sub>2</sub>
Manufactured by :	<b>Kokam Co., Ltd.</b>
Address :	<b>Head office : 1261-3 Jungwang-dong, Siheung-Si, Kyunggi-Do, Korea 429-849 (Sihwa-Kongdan 2Na 304) Factory : 483-42, Yachon-Ri, Gayakok-Myun, Nonsan-Si, Chungnam, Korea 320-844</b>
Emergency Telephone Number :	<b>CHEMTREC for Spills, Leaks, Fires</b>
International :	<b>1-703-527-3887</b>
U.S.A :	<b>1-800-424-9300</b>
Technical Contact Telephone Number :	<b>82-31-362-0100 or 82-41-742-9221</b>
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## Section 2. Composition/Information on Ingredients

Chemical Name	CAS #	ACGIH TLV	Percent of Content
Lithium Cobalt Dioxide(LiCoO <sub>2</sub> )	473894-38-1	0.02mg/m <sup>3</sup> as Co	20-50
Lithium Cobalt Manganese	182442-95-1	0.2mg/m <sup>3</sup> as Mn	
Nickel Oxide(LiMnNiCoO <sub>2</sub> )		0.2mg/m <sup>3</sup> as Ni	
Carbon(Graphite, Proprietary)	7782-42-5	2mg/m <sup>3</sup> (R)	15-35
PVDF(Polyvinylidene Fluoride)	24937-79-9		<8
Aluminum Foil	7429-90-5		3-12
Copper Foil	7440-50-8		3-12
Electrolyte	EC : 96-49-1 EMC : 623-53-0 LiPF6 : 21324-40-3		10-20
Al Film Cover	N/A		<5

**The balance of the battery is inert materials**

ACGIH : American Council of Government Industrial Hygienists

TLV : Threshold Limit Value are personal exposure limits determined by the ACGIH

## Section 3. Hazards Identification

### Emergency overview :

Do not open or disassemble.

Do not expose to fire or open flame.

Do not mix with batteries of varying sizes, chemistries or types.

Do not puncture, deform incinerate or heat above 85°C.

### Potential health effects :

The materials contained in this battery may only represent a hazard if the integrity of the battery is compromised or if the battery is physically or electrically abused.

#### (1) Physical :

The Lithium ion polymer rechargeable batteries described in this Material Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the Manufacturer.

Under normal conditions of use, the solid electrode materials and liquid electrolyte they contain are non-reactive provided the battery integrity is maintained and seals remain intact.

Risk of exposure is only in case of abuse (mechanical, thermal, electrical) leading to the activation of safety valves and/or the rupture of the battery containers. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow, depending upon the circumstances.

#### (2) Chemical :

### Classification of dangerous substances contained into the product

**As per directive 67/548/EEC**

Substance		Melting Point	Boiling Point	Classification			
CAS No.	Chemical Symbol			Exposure Limit	Indication of danger	Special risk(1)	Safety advice(2)
473894-38-1 182442-95-1	LiCoO <sub>2</sub> LiMnNiCoO <sub>2</sub>	>1000 °C	N/A	0.1mg/m <sup>3</sup> as Co 1.0mg/m <sup>3</sup> as Ni OSHA		R22 R43	S2 S22 S24 S26 S36
EC : 96-49-1 EMC : 623-53-0	Organic Solvents (EC-EMC)	EC : 38 °C EMC : 4 °C	EC : 243 °C EMC : 90 °C	None established OSHA	Flammable	R21 R22 R41 R42/43	S2 S24 S26 S35 S37 S45
21324-40-3	LiPF <sub>6</sub>	N/A (decomposes at 160 °C)	N/A	None established OSHA	Irritant Corrosive	R14 R21 R22 R41 R43	S2 S8 S22 S24 S26 S36 S37 S45

(1) – Nature of special risks :

- R14 Reacts with water
- R21 Harmful in contact with skin
- R22 Harmful if swallowed
- R41 Risk of serious damage to the eye
- R42/43 May cause sensitization by inhalation and skin contact
- R43 May cause sensitization by skin contact

(2) – Safety advices :

- S2 Keep out of reach from children
- S8 Keep away from moisture
- S22 Do not breathe dust
- S24 Avoid contact with skin
- S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical Protective clothing
- S36 Wear suitable protective clothing
- S37 Wear suitable gloves

#### Section 4. First Aid Measures

In case of battery rupture or explosion, evacuate personnel from contaminated area and provide maximum ventilation to clear out fumes/gases

In all case, seek medical attention

**Eye Contacts :** Flush with plenty of water(eyelids held open) for at 15 minutes.

**Skin Contacts :** Remove all contaminated clothing and flush affected areas with plenty of water and soap for at least 15 minutes.

Do not apply greases or ointments.

**Ingestion :** Dilute by giving plenty of water and get immediate medical attention.

Assure that the victim does not aspirate vomited material by se of potential drainage

Assure that mucus does not obstruct the airway.

Do not give anything y mouth to an unconscious person.

**Inhalation :** Remove to fresh air and ventilate the contaminated area.

Give oxygen or artificial respiration if needed.

#### Section 5. Fire Fighting Measures

**Fire and explosion hazard :**The battery can leak and/or spout vaporized or decomposed and

combustible electrolyte fumes in case of exposure above 70 °C resulting from inappropriate use or the environment.

Cells or batteries may flame or leak potentially hazardous organic vapors if exposed to excessive heat or fire. Fire, excessive heat, or over voltage conditions may produce hazardous decomposition products.

Damaged or opened cells or batteries can result in rapid heating and the release of flammable vapors.

Vapors may be heavier than air and may travel along the ground or be moved by ventilation to an ignition source and flash back

Fire, excessive heat, or over voltage conditions may produce hazardous decomposition products.

Use a positive pressure self-contained breathing apparatus if batteries are involved in a fire. Full protective clothing is necessary. During water application, caution is advised as burning pieces of flammable particles may be ejected from the fire.

**Extinguishing Media :**

Suitable CO<sub>2</sub>

Dry chemical or Foam extinguishers

Not to be used : Type D extinguishers

**Special exposure hazards :** Following cell overheating due to external source or due to improper use, electrolyte leakage or battery container rupture may occur and release inner component/material in the environment

**Eye contact :** The electrolyte solution contained in the battery is irritant to ocular tissues.

**Skin contact :** The electrolyte solution contained in the battery causes skin irritation.

**Ingestion :** The ingestion of electrolyte solution causes tissue damage to throat and gastro/respiratory tract.

**Inhalation :** Contents of a leaking or ruptured battery can cause respiratory tract, mucus, membrane irritation and edema.

**Special Protective equipment :** Use self-contained breathing apparatus to avoid breathing irritant fumes.

Wear protective clothing and body contact with electrolyte solution

## Section 6. Accidental Release Measures

The material contained within the batteries would only be expelled under abusive conditions.

Using shovel or broom, cover battery or spilled substances with dry sand or vermiculite, place in

approved container (after cooling if necessary) and dispose in accordance with local regulations.

## Section 7. Handling and Storage

The batteries should not be opened, destroyed nor incinerated since they may leak or rupture and release in the environment the ingredients they contain.

**Handling** : Batteries are designed to be recharged. However, improperly charging a cell or battery may cause the cell or battery to flame.

Use only approved chargers and Procedures.

Never disassemble a battery or bypass any safety device.

Do not crush, pierce, short (+) and (-) battery terminals with conductive (i.e. metal) goods.

Do not directly heat or solder.

Do not throw into fire.

Do not mix batteries of different types and brands.

Do not mix new and used batteries.

Keep batteries in non conductive (i.e. plastic) trays.

**Storage** : Do not store batteries above 60 °C or below -20 °C.

Store batteries in a cool (below 30 °C), dry area that is subject to little temperature change.

Elevated temperatures can result in reduced battery service life.

Battery exposure to temperatures in excess of 130 °C will result in the battery venting flammable liquid and gases.

Batteries should be separated from other materials and stored in a noncombustible, well ventilated, sprinkler-protected structure with sufficient clearance between walls and battery stacks.

Do not store batteries in a manner that allows terminals to short circuit.

Extended short-circuiting creates high temperatures in the cell. High temperatures can cause burns in skin or cause the cell to flame.

Avoid reversing battery polarity within the battery assembly. To do so may cause cell to flame or to leak.

Do not place batteries near heating equipment, nor expose to direct sunlight for long periods.

**Other** : Follow manufacturers recommendations regarding maximum recommended currents and operating temperature range. Applying pressure on deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

## Section 8. Exposure Controls / Personal Protection

No engineering controls are required for handling batteries that have not been damaged.

**Respiratory protection** : *Not necessary under normal use.*

In case of battery rupture, use self contained full-face respiratory equipment

- Hand Protection :** *Not necessary under normal use.*  
Use gloves of handling a leaking or ruptured battery.
- Eye Protection :** *Not necessary under normal use.*  
Wear safety goggles or glasses with side shields if handling a leaking or ruptured battery.
- Skin protection :** *Not necessary under normal use.*  
Use rubber protective working in case of handling of a ruptured battery

## Section 9. Physical And Chemical Properties

### Temperature range :

	Continuous	Occasional
In storage	+30 °C max	-20/+60 °C
During discharge	-20/+60 °C	-20/+60 °C
During charge	0/+45 °C	0/+45 °C

## Section 10. Stability And Reactivity

- Conditions to avoid :** Heat above 60 °C or incinerate.  
Deform, mutilate, crush, pierce, disassemble  
Short circuit  
Prolonged exposure to humid conditions.
- Materials to avoid :** N/A
- Hazardous decomposition products :**  
Fire, excessive heat, or over voltage conditions may produce hazardous decomposition products.

## Section 11. Toxicological Information

- (1) Irritancy : The electrolytes contained in this battery can irritate eyes with any contact.  
Prolonged contact with the skin or mucous membranes may cause irritation.
- (2) Sensitization : No information is available at this time.
- (3) Carcinogenicity : No information is available at this time.
- (4) Reproductive toxicity : No information is available at this time.
- (5) Teratogenicity : No information is available at this time.
- (6) Mutagenicity : No information is available at this time.

## Section 12. Ecological Information

Not applicable to this material / product.

## Section 13. Disposal Considerations

Dispose in accordance with applicable regulations which vary from country to country.

(In most countries, the trashing of used batteries is forbidden and the end-users are invited to dispose them properly, eventually through not-for-profit profit organizations, mandated by local government or organized on a voluntary basis by professionals).

Batteries should be completely discharged prior to disposal and / or the terminals taped or capped to prevent short circuit.

When completely discharged it is not considered hazardous.

This product does not contain any materials listed by the United States EPA as requiring specific waste disposal requirements.

These are exempted from the hazardous waste disposal standards under Universal Waste Regulations. Disposal of large quantities of Lithium-Ion batteries or cells may be subject to Federal, State, or Local regulations.

Consult your local, state and provincial regulations regarding disposal of these batteries.

## Section 14. Transport Information

### United Nations :

UN No: 3480

Classification: 9

Packing: Packing Instructions 965 for Air Transport  
IMDG for Sea Transport

<b>International conventions :</b>	Air	IATA	Yes
	Sea	IMDG	Yes
	Land	ADR (road)	Yes
		RID (Rail)	Yes

**Other :** in the USA Code of Federal Regulations  
(49 CFR Ch. 1 § 173-185)

### Special packaging information

Cells and batteries must be packed in inner packaging that completely encloses the cell or battery.

Cells and batteries must be protected to avoid short circuits.

Each package must be capable of withstanding a 1.2 m drop test in any orientation without:

1. Damage to cells or batteries contained within the packaging;
2. Shifting of the contents allowing battery to battery contact; and
3. Release of contents.

### Special shipping information :

This battery has been tested to Section 38.3 of 'UN Manual of Tests and Criteria'. The amount of Lithium contained in these batteries is below the limits set by the DOT in Section 49CFR173 and IATA. These can be shipped with the following label:



**LITHIUM ION or LITHIUM POLYMER RECHARGEABLE BATTERIES INSIDE**

(No Lithium Metal)

The package contains lithium ion or polymer cell or batteries. The package must be handled with care and that a flammability hazard exists if the package is damaged. Special procedures should be followed in the event of the package is damaged. To include inspection and repacking, if necessary.

For emergency information, call CHEMTREC.

1-703-527-3887 [International]

1-800-424-9300 [U.S.A]

**Section 15. Regulatory Information**

The transport of rechargeable Lithium-ion batteries regulated by the United Nations as detailed in the "Model Regulations on the Transport of Dangerous Goods Ref. ST/SG/AC.10/1 Revision 11 1999".

Depending on their lithium equivalent weight content, and ability to pass safety test defined by UN in the "Recommendations on the Transport of Dangerous Goods Chapter 38.3 Manual of Tests and Criteria Ref. ST/SG/AC/ 10/11 Third Revised Edition 1999". The Lithium-ion cells and the battery packs may or may not be assigned to the UN No 3480 Class-9 that is restricted for transport.

**Section 16. Other Information**

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty (ether expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein.



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