MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT IDENTIFICATION

Product Identification

Polymer Lithium-Ion Rechargeable Battery	
Nominal Voltage(V):	3.7
P/N:	SP371031AB
Nominal Capacity(mAh):	90
UL NO:	MH27663
Customer P/N:	N/A

Manufacture Identification

Tianjin Lishen Battery Joint-Stock CO. LTD.
6 Lanyuan Road, Huayuan Hi-Tech
Industry Park, Tianjin 300384, China
Http://www.lishen.com.cn

86 - 22 - 83710366
Phone Number (For Information)
86 - 22 - 83710366
Emergency Phone Number Telex'
86 - 22 - 83710366

Note: Blank spaces are not permitted. If any item is not applicable or no information is available, the space must be marked to indicate that.

SECTION 2 HAZARDS IDENTIFICATION

Primary Routes of Entry: ■ Inhalation ■ Ingestion ■ Skin Absorption ■ Eye contact

CARCINOGEN LISTED IN: □ NTP □ OSHA □ LARC Monograph □ NOT Listed

Health Hazards

Acute and chronic

All chemicals are contained in a sealed can. Risk of exposure occurs only,if the battery is mechanically or electrically abused(mechanical, thermal, electrical), which leads to the rupture of the battery container. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/fire may follow, depending upon the circumstances.

Medical Conditions Generally Aggravated By Exposure

An acute exposure will not generally aggravate any medical condition.

Symptoms of Exposure	Skin contact, no effect under routine handling and use.
Eye Contact	No effect under routine handling and use
Skin Contact	No effect under routine handling and use
Ingestion	No effect under routine handling and use
Inhalation	No
Reported as carcinogen	Not applicable

SECTION 3 COMPOSITION & INFORMATION ON INGREDIENTS

					OSHA	ACGIH	CAS Number	OTHER LIMITS
Equivalent lithium content per cell（g）				0.027				
COMPONENTS-Chemical Name and Common Names (Hazardous Components 1% or greater, Carcinogens 0.1% or greater)				%	PEL	TLV		RECOMMENDED
Hazardous Ingredients:	**Cathode active material**	**Lithium Cobalt Oxide**		38%			12190-79-3	
	Anode active material	**Graphite**		19%			7782-42-5	
	Electrolyte	**$LiPF_6$**	**12%**	2%			21324-40-3	
		EC	**30%**	5%			96-49-1	
		EMC	**50%**	8%			623-53-0	
		PC	**8%**	1%			108-32-7	
Non-Hazardous Ingredients:	**Anode tab**	**Nickel**		1%			7440-02-0	
	Cathode tab	**Aluminum**		0%			7429-90-5	
	AL foil	**Aluminum**		5%			7429-90-5	
	Cu foil	**Copper**		11%			7440-50-8	
	Conductive additive	**Carbon**		1%			7440-44-0	
	Adhesive	**Polyvinylidene fluoride**		2%			24937-79-9	
	Tape	**Polypropylene**		1%			9003-07-0	
	Separator	**Polypropylene**		3%			9003-07-0	
		Polyethylene					9002-88-4	
	Package	**Nylon**		3%			32131-17-2	
		Aluminum					7429-90-5	
		Polypropylene					9003-07-0	
Total				100%				

SECTION 4 FIRST-AID MEASURES

If exposure to internal materials in cell due to damaged outer casing, the following actions are recommended.

Eye Contact	In case of eye contact, flush with lot of water for 15 minutes, and get medical help.
Skin Contact	In case of skin contact with contents of battery, flush immediately with water.
Inhalation	In case of light inhalation ,move to an area with flash air immediately, if irritation persists, get medical help.
Ingestion	In case of ingestion, drink milk/water to induce vomiting and wash out, get medical help.

SECTION 5 FIREFIGHTING MEASURES

Extinguisher Media:

CO_2 or dry chemical power

Special Fire-Fighting Procedures:

In case of fire in cell original containers, use CO2 or dry chemical extinguisher; For fire in an adjacent area, water can be used.

SECTION 6 ACCIDENTAL RELEASE MEASURES

On Land:

Place material into suitable containers, If the skin has come into contact with the electrolyte, it should be washed thoroughly with water, Sand or earth should be used to absorb any exuded material. Seal leaking battery and contaminated absorbent material should be treated by local regulation, and call local fire/police department to ask for help.·

In Water:

If possible, remove from water far from body in special fixture, and call local fire/police department to ask for help

SECTION 7 HANDING AND STORAGE

Handling:

Take all precautions mentioned in this document and operate the battery within the temperature range of -20℃ and 45℃.

No special protective clothing required for handling individual cells in corrective operational method.

Improper handling of lithium ion battery may result in injury or damage from electrolyte leakage, heating, ignition or explosion. So do not crush, pierce, short cell/battery terminals with conductive material; Do not directly heat or solder; do not throw into fire; do not place cell/battery in non conductive trays.

Storage:

Store the battery in a cool, drying place, without chemical vapor or excessive humidity.

SECTION 8 EXPOSURE CONTROLS & PERSONAL PROTECTION

Engineering Controls:

keep away from heat and open flame, prevent hard & sharp thing penetration, store in a cool & dry place.

Personal Protection:

Respiratory Protection: Not necessary under normal operations condition. SCAB required in the event of a fire.
Eye/Face Protection: Not necessary under normal operation condition.
Glove protection: Not necessary under normal operation condition.
Foot Protection: Steel toed shoes recommended for Large container handling.

Ventilation to Be Used	□ **Local Exhaust** Not necessary under conditions of Normal use.	□ **Mechanical (General)** Not necessary under conditions of Normal use.
		□ **Special** Not necessary under conditions of Normal use.
	□ **Other (Specify)** Not necessary under normal operation conditions.	

Other Protective Clothing and Equipment

Not necessary under normal operation conditions.

Hygienic Work Practices

Not necessary under normal operation conditions.

SECTION 9 PHYSICAL /CHEMICAL PROPERTIES

Specific Gravity (H2O=1):

$LiCoO_2$:3.80 Graphite:2.0~2.2

Melting Point:

LiCoO2:1130℃ Graphite:3500-3900℃

Appearance and Odor:

$LiCoO_2$ is a gray odorless power; Graphite is a black or odorless power;

Organic solvent is a colorless liquid; Lithium salt is a white, crystalline and odorless power.

SECTION 10 STABILITY & REACTIVITY DATA

Stability	**Conditions to Avoid:**
■ Stable	Do not heat or incinerate the battery，Never impact, pierce or crush the battery.
	Do not disassemble or modify the battery，
□ Unstable	Do not charge the battery under high temperature conditions such as near a fire or in the direct sunlight.
	Do not shot-circuit the battery by connect the positive and negative terminals with a metal material.
	Do not allow the battery to get wet or be immersed in water.

Incompatibility (Materials to Avoid)

Water, salted water, other solvent with water

Hazardous Decomposition Products

N/A

Hazardous Polymerization	Conditions to Avoid
□ May Occur	
■ Will Not Occur	

SECTION 11 TOXICOLOGICAL INFORMATION

This product does not elicit toxicological properties during routine handling and use.

SECTION 12 ECOLOGICAL INFORMATION

Cobalt and its compounds can pose a threat if released to environment. The detail information are showed in waste disposal method in Section 13 "Disposal Consideration".

SECTION 13 DISPOSAL CONSIDERATIONS

There is no contamination during normal operation and use. Lithium batteries should have their terminals insulated prior to disposal, do not throw away a used battery and provide them for recycling company.

Open cells should be treated as hazardous waste. If the leakage or other material is Released, we should take actions as follows:

Leave the area, allow the batteries to cool down, let the vapors to dissipate .
Avoid skin and eye contact or inhalation of vapors. Remove spiller liquid with absorbent and incinerate after.

Waste Disposal method Opened cells should be treated as hazardous waste

Incineration: incineration should never be performed by battery users but eventually by trained professionals in authorized facilities with proper gas and fumes treatment.

Landfilling:According to the proper laws and regulations in different countries or areas, the battery should be buried deeply in the specified place;

Recycling: Send to authorized recycling facilities to get Co,Cu and Al,eventually through licensed waste carrier;

SECTION 14 Transportation

Lishen's SP371031AB Lithium Ion batteries are considered to be "rechargeable batteries" and meet the requirements of transportation by th U.S. Department of Transportation, Civil Aviation Organization (ICAO) Technical Instructions (2014-2015 Edition), the International Air Transport Association (IATA) Dangerous Goods Regulations (56th Edition, 2015). Packing instruction 965 Section IB or II for Lithium Ion battery, the International Maritime Dangerous Goods (IMDG) Code (2010 Edition) with special provision 188 & 230, US Harzardous Materials 49 CFR(Code of Federal Regulations)Sections 173-185 Lithium batteries and cells. the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria 38.3 Lithium 4th revised edition(UN3480) as "non-dangerous goods" or "non-hazardous materials". The mentioned batteries are complied with the special provision, SectionⅡ of PI965 to PI967. These lithium can be transported in nonrestrictive material and as Non-Dangerous Goods as they meet all the requirements in below:

1	Lithium content requirement
1.1	For the bar cells,the lithium content can not overpass 20Wt/h;
1.2	For the batteries, the lithium content can not overpass 100Wt/h;
2	Meet with UN Test Requirement
2.1	All the cell and battery must be verified to meet with all the requirements in Part 3 -38.3 item (UN38.3 tests) for "Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria" .
3	Package Requirement
3.1	The cell and battery must be packaged specially and singly, and put into hard outer package to prevent short-circuit if they do not be assembled in finished equipments (such as mobile phone,camera,NBPC.and so on)
3.2	The cell quantity is more than 24pcs or the battery quantity is more than 12pcs, they must be asked to meet with the requirements in blow besides they are assembled in finished equipment.
a	Every package must be marked in the content that the packages are loaded in lithium cells or batteries, also add new lithium iron operation label , also need point out the corrective actions when the packages are damaged.
b	Every batch shipment must be appendixes document which should contain the content that the packages are loaded in lithium cells or batteries, also need point out the corrective actions when the packages are damaged.
c	Every package must pass 1.2mm fall test in any direction. No damage for the cells and batteries, no move and touch together, no cells or batteries escape from the package.
d	Every package weight can not overpass 10kg if the batteries can not be assembled in finished equipment.

SECTION 15 REGULATORY INFORMATION

OSHA Hazard Communication Standard (29 CFR 1910.1200)

☐ Hazardous ☑ Non-hazardous

SECTION 16 OTHER INFORMATION

There is no hazards in accordance with the UN recommendations test.(UN manual of tested and criteria 38.3)

Battery Number	**SP371031AB**
Nominal Voltage	**3.7**
Nominal Capacity	**90mAh**
Battery Mass	**5g**
Equivalent Lithium Content	**0.027g**

Test NO	Test Item	Criteria	Result
38.3.4.1	Altitude Test	No mass loss,leakage,venting,disassembly,rupture,and fire.OCV should not be less than 90% before testing	Passed
38.3.4.2	Thermal Test	No mass loss,leakage,venting,disassembly,rupture,and fire.OCV should not be less than 90% before testing	Passed
38.3.4.3	Vibration	No mass loss,leakage,venting,disassembly,rupture,and fire.OCV should not be less than 90% before testing	Passed
38.3.4.4	Shock	No mass loss,leakage,venting,disassembly,rupture,and fire.OCV should not be less than 90% before testing	Passed
38.3.4.5	External Short Circuit	External temperature should not exceed 170degC.No disassembly, and fire within six hours of this test.	Passed
38.3.4.6	Impact	External temperature should not exceed 170degC.No disassembly, and fire within six hours of this test.	------
38.3.4.7	Overcharge	No disassembly, and fire within seven days of this test.	Passed
38.3.4.8	Forced Discharge	No disassembly, and fire within seven days of this test.	------

SYNERGY SCIENTECH CORP. -- Advanced Hybrid Batteries

MATERIAL SAFETY DATA SHEET

Manufacturer's CAGE: SYNERGY

Part No. Indicator: A

Part Number/Trade Name: AHB Series- Lithium ion Polymer batteries.

Model name: AHB371030PK

Voltage: 3.7V

Nominal Capacity: 90mAh;

Minimum Capacity: 85mAh

Lithium metal content: 0.03 g

Wh : 0.3Wh

Weight :3.2g

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1. General Information

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Company's Name: SYNERGY SCIENTECH CORP.

Company's Street: 7F, No. 9, Park Ave. II, Hsinchu Science Park, Hsinchu, Taiwan 30077 R.O.C.

Company's City: HSIN-CHU, TAIWAN

Company's Emerge PhD #: 886-3-564-3700

Company's Info Ph #: 886-3-564-3700

Record No. For Safety Entry: 001

Tot Safety Entries This Sty #: 001

Status: SMJ

Date MSDS Prepared: January 1, 2015 (8^{th} Edition)

Safety Data Review Date: January 1, 2015

MSDS Preparer's Name: Dr. Kevin Wang

Preparer's Company: SAME

MSDS Serial Number: LIASN

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2. Ingredients/Identity Information

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Material Name. (e.g. Sn alloy)	Substance Name (e.g. Copper (Cu))	CAS No.	Percentage (%)
active material	$LiCoO_2$	12190-79-3	32.62
Binder-PVDF	Poly(vinyliden difluoride)	24937-79-9	1.04
conditive material	Carbon	1333-86-4	0.78
conditive material	Carbon	1333-86-4	0.26
foil	Aluminium	7429-90-5	4.61
active material	Carbon	1333-86-4	15.92
Binder-PVDF	Poly(vinyliden difluoride)	24937-79-9	1.3

conditive material	Carbon	1333-86-4	0.09
additive	Oxalic acid	144-62-7	0.05
foil	Copper	7440-50-8	7.87
electrolyte-solvent	Ethylene carbonate	96-49-1	5.06
electrolyte-solvent	Diethyl carbonate	105-58-8	3.72
electrolyte-solvent	Ethyl methyl carbonate	623-53-0	3.83
electrolyte-additive	Lithium hexafluorophosphate	21324-40-3	1.82
separator	polyethylene	9002-88-4	3.62
tape-film	polyimide	75-55-8	0.1
tape-adhesive	Acrylic	79-10-7	0.03
tape-film	polyester	80595-68-2	0.14
tape-adhesive	Acrylic	79-10-7	0.03
Al bag	Nylon	32131-17-2	3.85
Al bag	Aluminium	7429-90-5	9.75
Al bag	Polypropylene	9003-07-0	2.57
tab lead	Nickel	7440-02-0	0.38
tab lead	polypropylene	9003-07-0	0.05
tab lead	Aluminium	7429-90-5	0.24
tab lead	polypropylene	9003-07-0	0.05
tab	Nickel	7440-02-0	0.22

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3. Hazards Identification

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Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: UNDER NORM CNDTNS OF USE, THESE CHEMICALS ARE CONTAINED IN SEALED CAN. RISK OF EXPOS OCCURS ONLY IF BATTERY IS MECHANICALLY ABUSED. ACUTE: INHAL: CONTENTS OF OPENED BATTERY CAN CAUSE CONTENTS OF OPENED BATTERY CAN CAUSE IRRIT.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

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4. First Aid Measures

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Explanation Carcinogenicity: NOT RELEVANT.

Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

WASH WITH SOAP AND WATER. EYES: IMMEDIATELY FLUSH THOROUGHLY WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL ATTENTION. INGESTION: CALL MD IMMEDIATELY (FP N).

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5. Fire Fighting Measures

Extinguishing Media: IN CASE OF FIRE, USE CARBON DIOXIDE OR DRY CHEMICAL EXTINGUISHERS.
Special Fire Fighting Proc: WEAR NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

6. Accidental Release Measures

Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering.

7. Handling and Storage

Wear suitable chemical resistant gloves, safety glasses and filtered cartridge respirator. Goggles, full face protection and other protective clothing is required if potential exists for direct exposure to liquid battery electrolyte.
In case Material is released or spilled: Carefully recover spillages with appropriate ladle and transfer to a suitably labeled, sealable container for safe disposal. Wash the spillage area neutorize with calclumhydroxide. Wear suitable personal protection during removal of spillages.
Be stored in clearly labeled, tightly closed exclusive containers in a cool, dry area.

8. Exposure Controls/Personal Protection

Ventilation: Use local exhaust.
Protective Gloves: Wear rubber or plastic gloves.
Eye/Face Protection: Wear safety glasses, goggles or full face protections.
Respiratory Protection: Wear filtered cartridge respirator or a respirator of greater protection.

9. Physical and Chemical Properties

Product Type: Solid
Appearance: Prismatic
Odor: Odorless

10. Stability and Reactivity

Stability: YES

Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomp Products: NONE SPECIFIED BY MANUFACTURER.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

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11. Toxicological Information

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In case electrolyte is spilled and explored with air, the HF could be released.
May include hydrogen fluoride and carbon oxides gas.
May cause skin and eye irritation when contacted.

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12. Ecological Information

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If the battery scrapped, it should be selected and disposed by professional company.

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13. Disposal Consideration

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Disposal should be in accordance with local, state or national legislation.

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14. Transport Information

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UN No: UN3480 / UN3481
The battery models listed have aggregate equivalent lithium content below the 0.03g and the Watt hour is not more than 100Wh. And shipment contains no item listed under IATA DGR Packing instruction PI-965 to PI-967 Section II and meets all requirements under UN Manual of Tests and Criteria Part III, subsection 38.3

UN 38.3 Lithium Battery		Test results	Remarks
NO	Test item	OK	Test 1 to 5 must be conducted in sequence on the same cell or battery
T1	Altitude simulation	OK	
T2	Thermal test	OK	
T3	Vibration	OK	
T4	Shock	OK	
T5	External short circuit	OK	
T6	Impact	OK	
T7	Overcharge	OK	Only battery do need this test item
T8	Forced discharge	OK	For cell only

The product is not classified as dangerous under the current edition of the 2014 IATA dangerous goods regulations. The products are safe for air transportation and not regulated by IATA DGR. Also they comply with the PI-965 to PI-967 Section II accordingly.

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15. Regulatory Information

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See ACGIH exposure limits information as noted in Section 3.

US: This MSDS meets/exceeds OSHA requirements

International: this MSDS conforms to European Union (UN), the International Standards Organization (ISO) and the International Labor Organization (ILO) and as documental in ANSI (American National Standards Institute) Standard Z400.1-1993.

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16. Other Information

Reference:

Chemical substances information: Japan Advanced Information center of Safety and Health

International Chemical Safety Cards (ICSCs): International Occupational Safety and Health Information Centre (CIS)

2002 TLVs and BELs: American Conference of Governmental Industrial Hygienists (ACGIH)

Dangerous Goods Regulations-55th Edition Effective 1 January 2014: International Air Transport Association (IATA)

IMDG Code-2008 Edition: International Maritime Organization (IMO)

The European Agreement concerning the International Carriage of Dangerous Goods by Road-2009: The United Nations Economic Commission for Europe (UNECE)

MSDS of raw materials prepared by the manufactures