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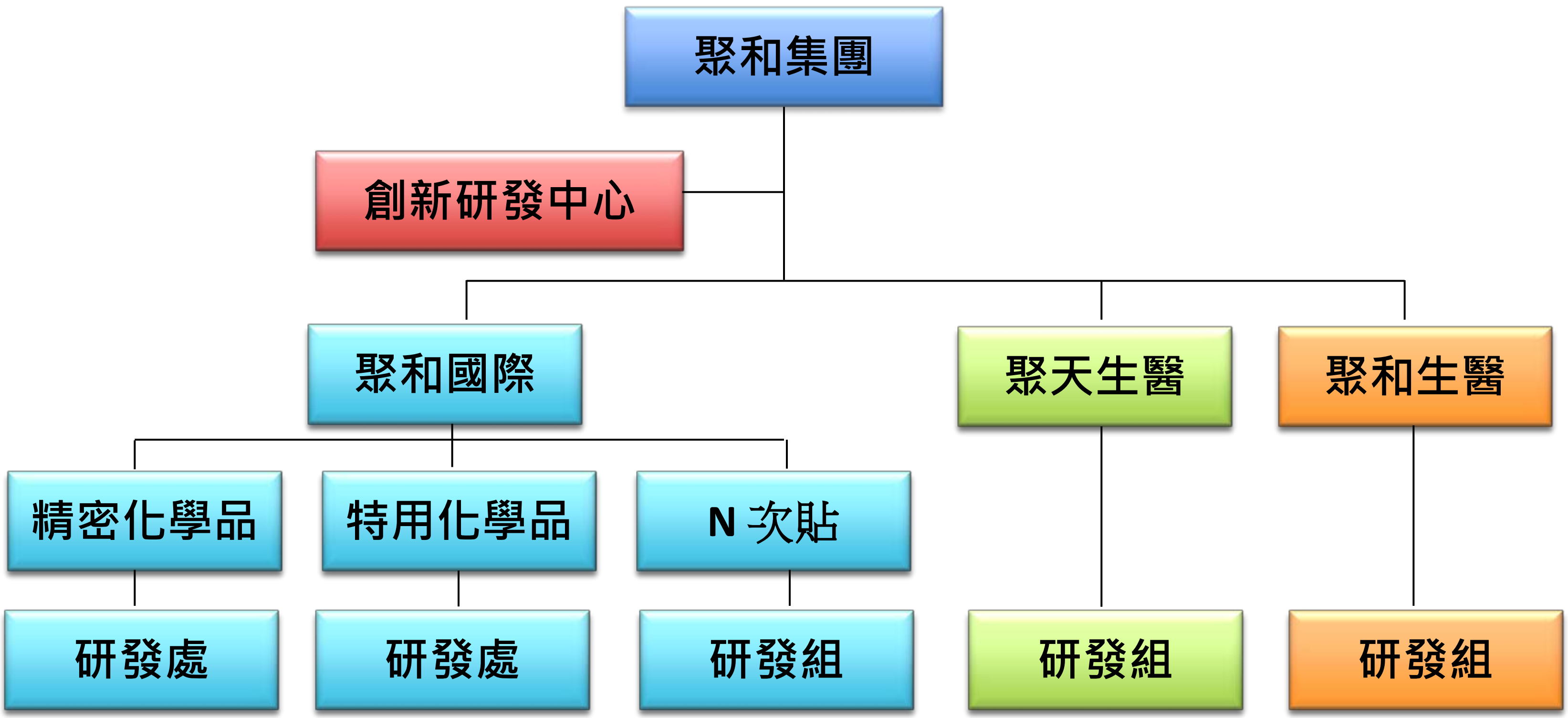

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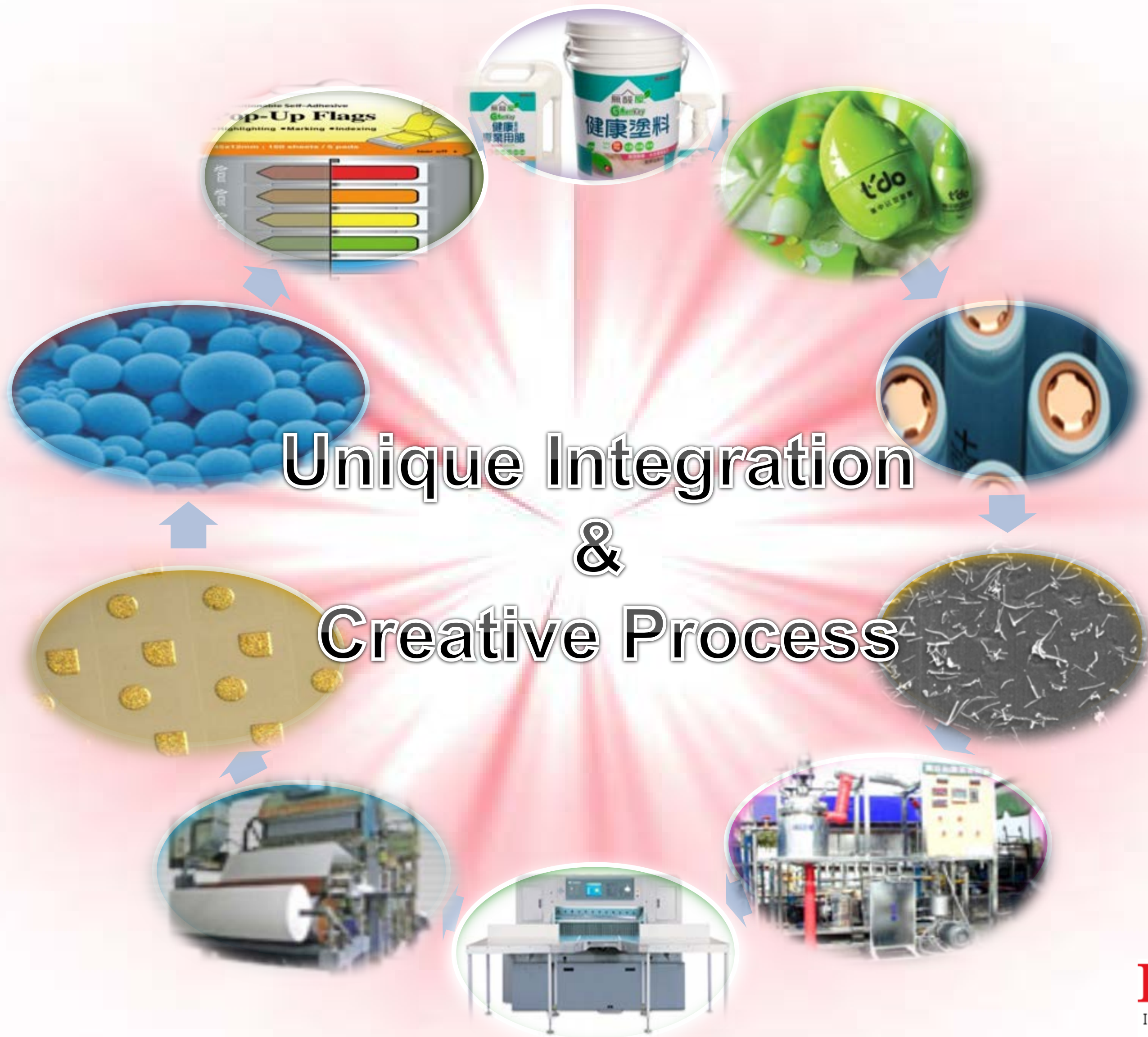

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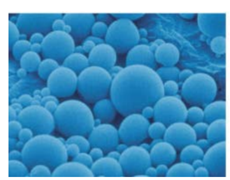

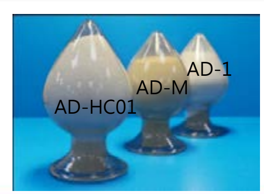

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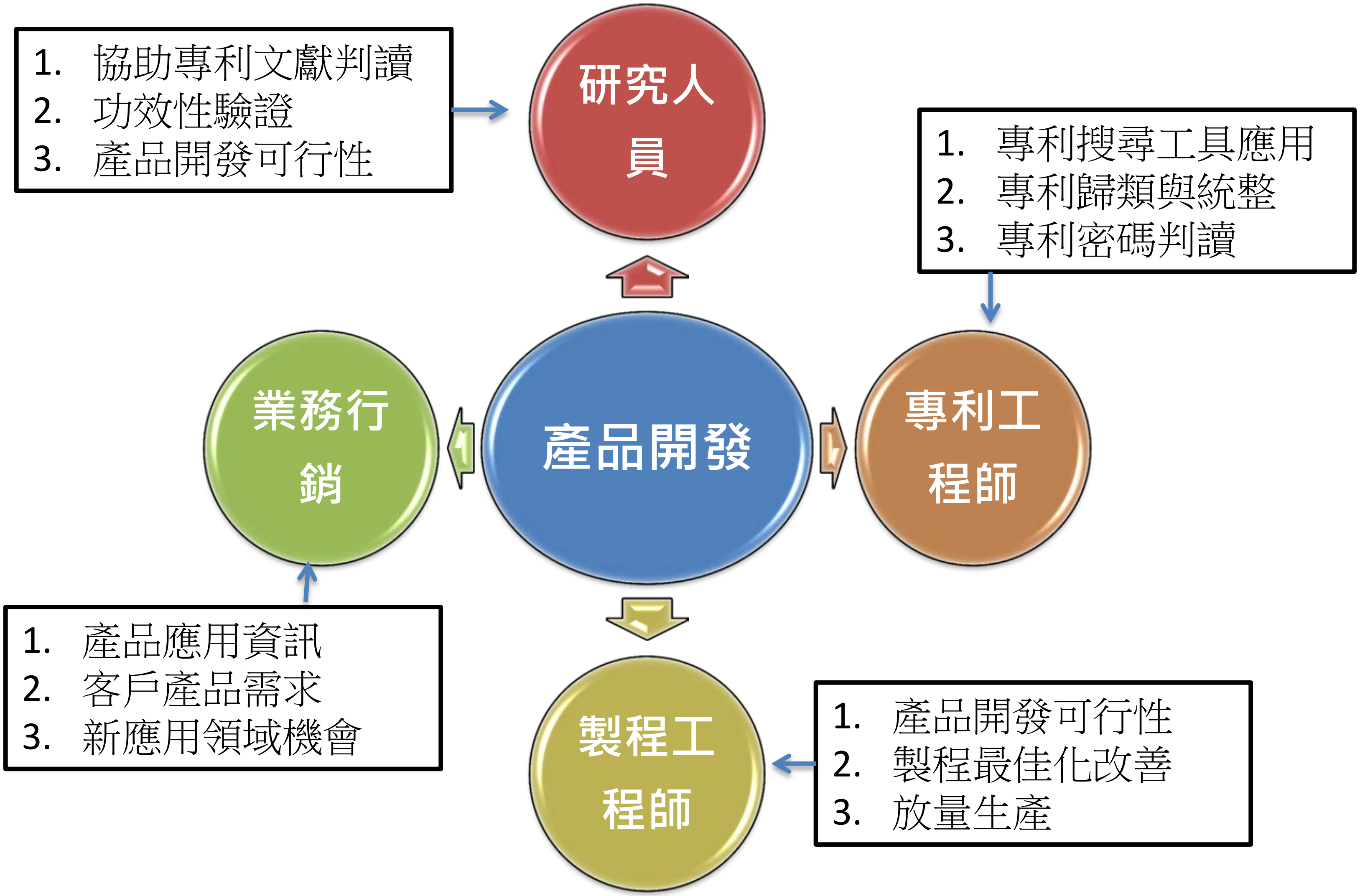

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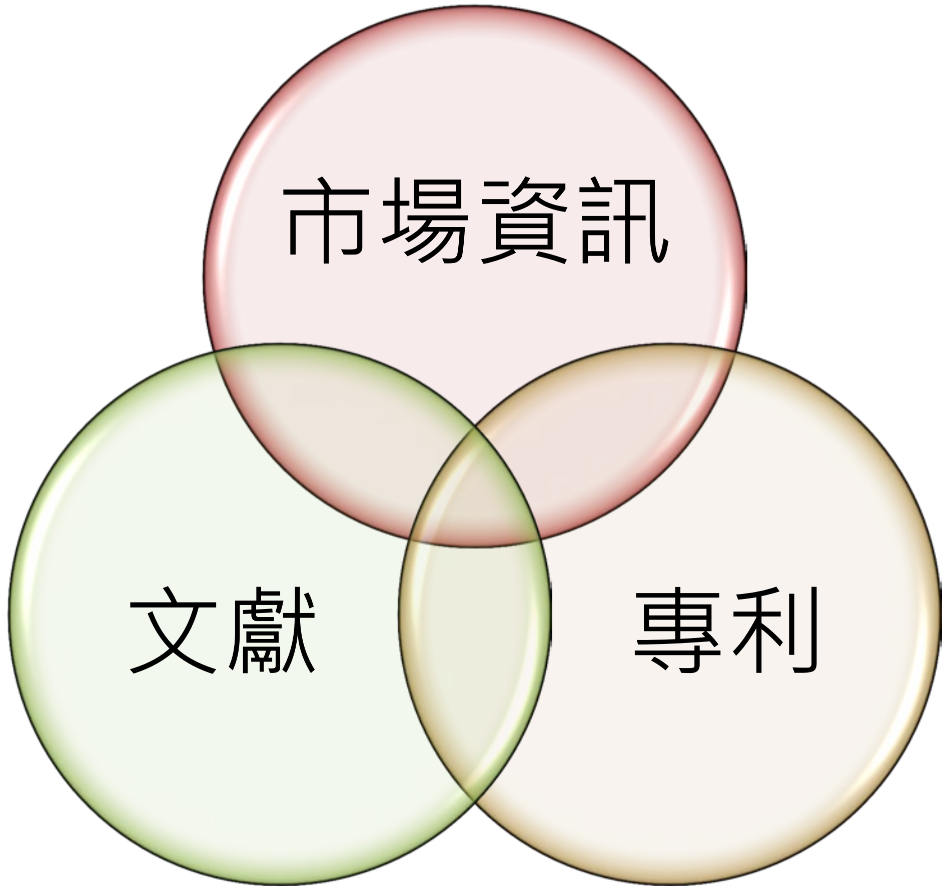

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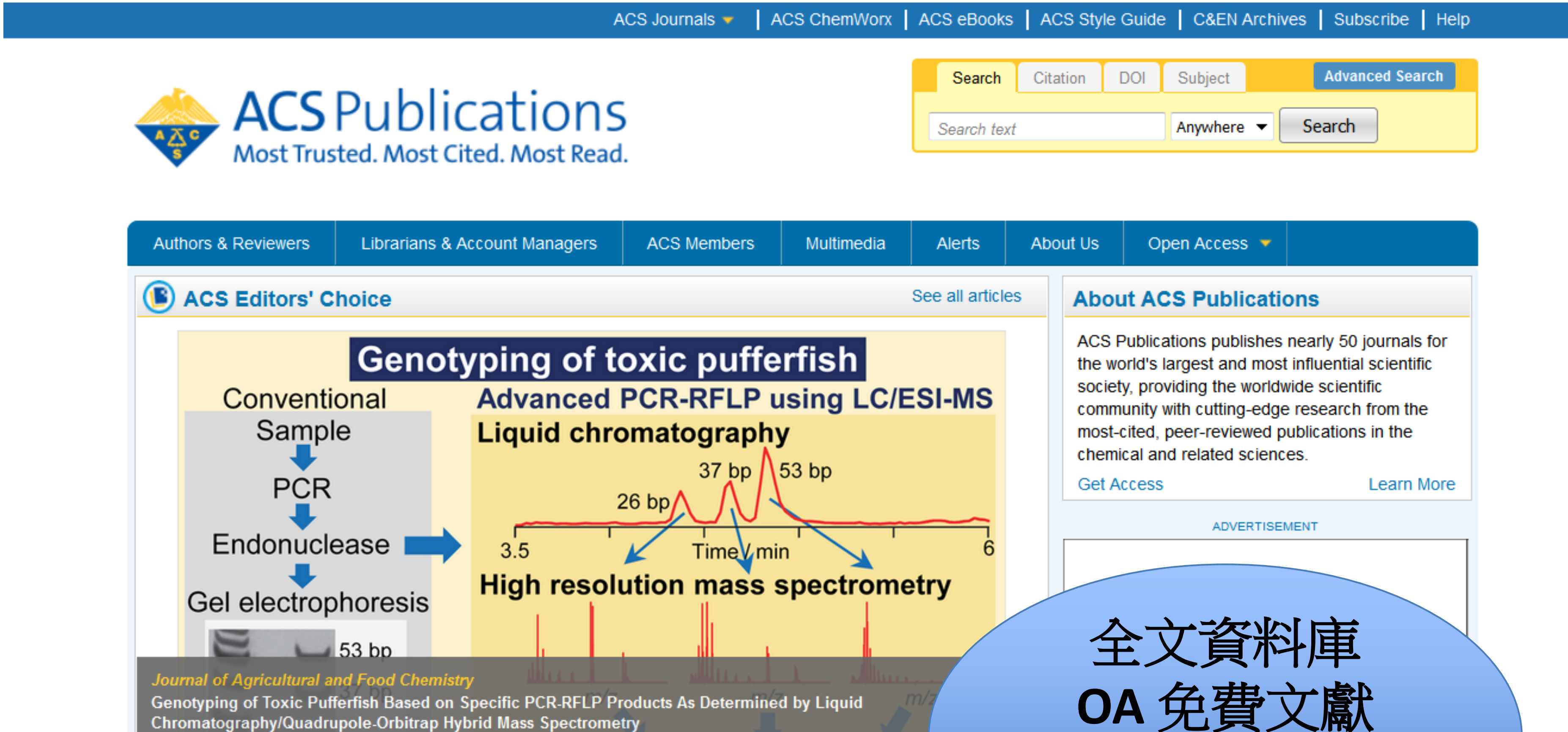

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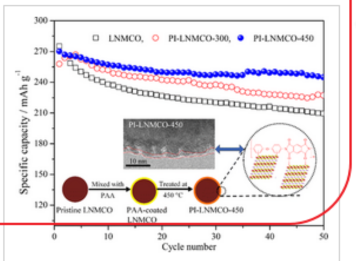
Polyimide Encapsulated Lithium-Rich Cathode Material for High Voltage Lithium-Ion Battery

Jie Zhang, Qingwen Lu, Jianhua Fang, Jiulin Wang, Jun Yang, and Yanna NuLi

ACS Appl. Mater. Interfaces, **2014**, *6* (20), pp 17965-17973
Publication Date (Web): September 17, 2014 (Research Article)
DOI: 10.1021/am504796n

Lithium-rich materials represented by $xLi_2MnO_3 \cdot (1-x)LiMO_2$ (M = Mn, Co, Ni) are attractive cathode materials for lithium-ion battery due to their high specific energy and low cost. However, some drawbacks of these materials such as poor cycle and rate …



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Prospects of Nanoscience with Nanocrystals

Maksym V. Kovalenko, Liberato Manna, Andreu Cabot, Zeger Hens, Dmitri V. Talapin, Cherie R. Kagan, Victor I. Klimov, Andrey L. Rogach, Peter Reiss, Delia J. Milliron, Philippe Guyot-Sionnnest, Gerasimos Konstantatos, Wolfgang J. Parak, Taeghwan Hyeon, Brian A. Korgel, Christopher B. Murray, and Wolfgang Heiss

ACS Nano, **2015**, *9* (2), pp 1012-1057
Publication Date (Web): January 22, 2015 (Nano Focus)
DOI: 10.1021/nn506223h

Colloidal nanocrystals (NCs, *i.e.*, crystalline nanoparticles) have become an important class of materials with great potential for applications ranging from medicine to electronic and optoelectronic devices. Today's strong research focus on NCs has been ...

Abstract

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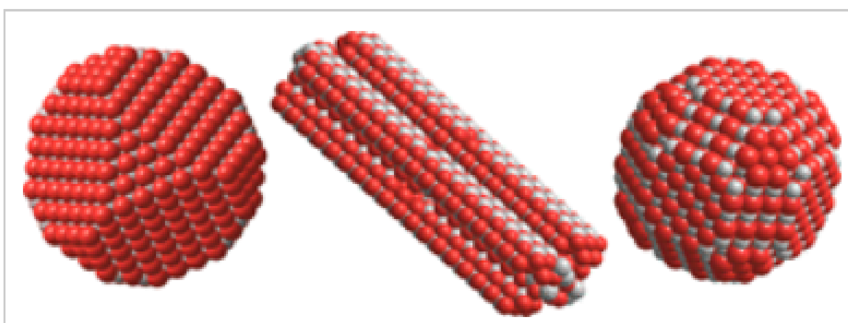

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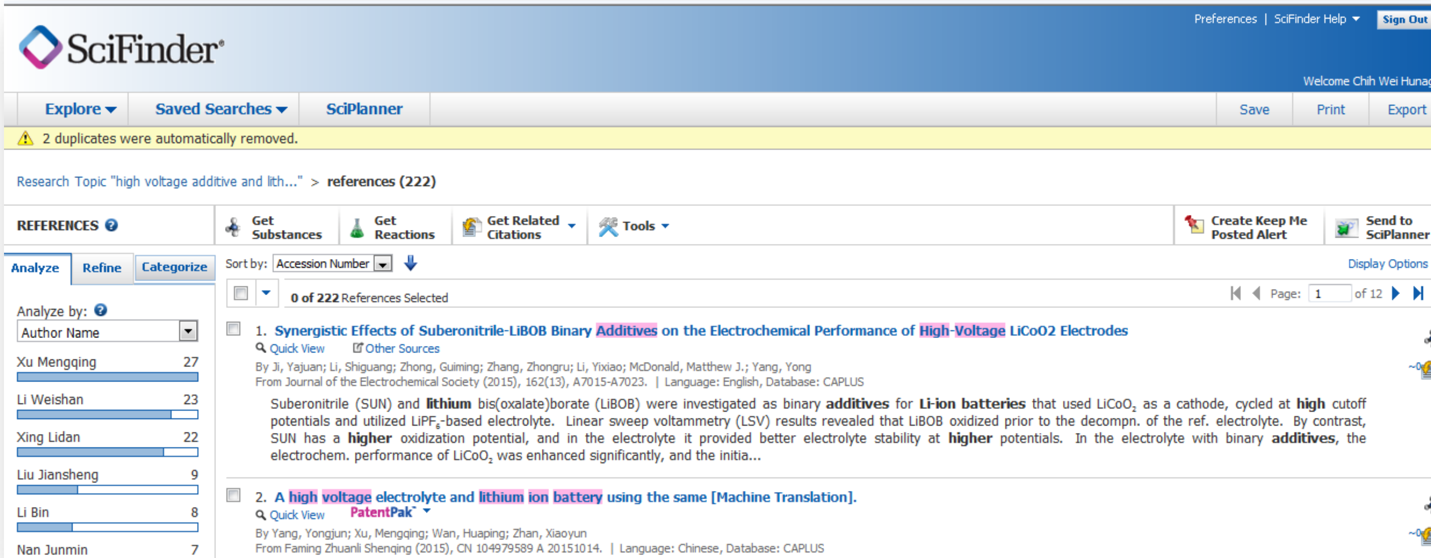
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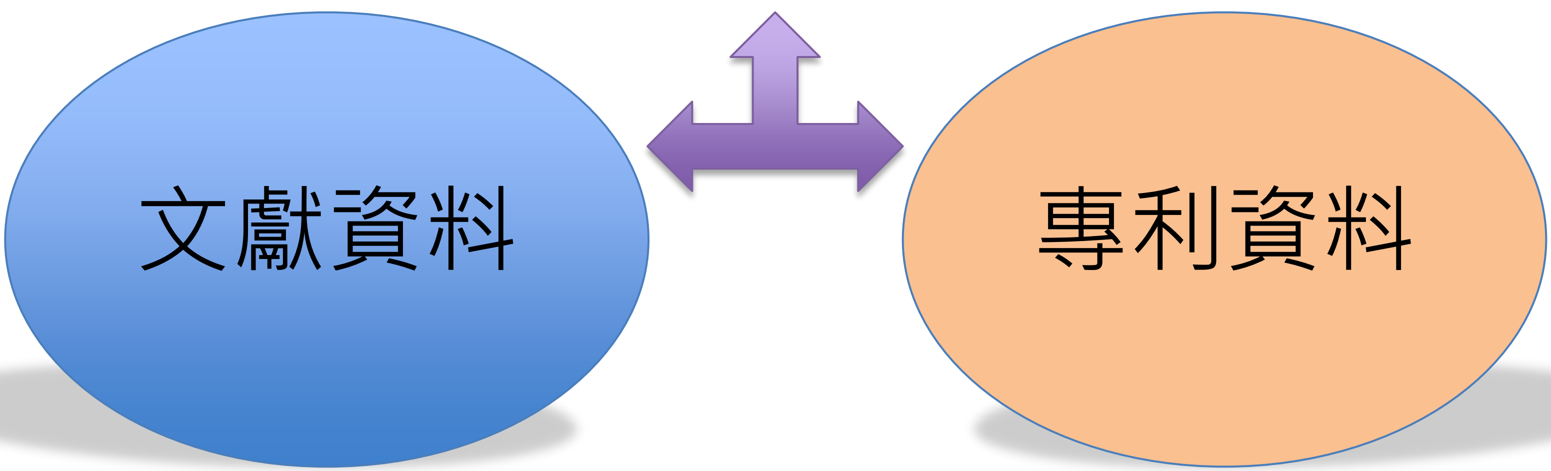
1. Synergistic Effects of Suberonitrile-LiBOB Binary Additives on the Electrochemical Performance of High-Voltage LiCoO2 Electrodes
Quick View
Other Sources
By Ji, Yajuan; Li, Shiguang; Zhong, Guiming; Zhang, Zhongru; Li, Yixiao; McDonald, Matthew J.; Yang, Yong
From Journal of the Electrochemical Society (2015), 162(13), A7015-A7023. | Language: English, Database: CAPLUS
Suberonitrile (SUN) and lithium bis(oxalate)borate (LiBOB) were investigated as binary additives for Li-ion batteries that used LiCoO2 as a cathode, cycled at high cutoff potentials and utilized LiPF6-based electrolyte. Linear sweep voltammetry (LSV) results revealed that LiBOB oxidized prior to the decompn. of the ref. electrolyte. By contrast, SUN has a higher oxidization potential, and in the electrolyte it provided better electrolyte stability at higher potentials. In the electrolyte with binary additives, the electrochem. performance of LiCoO2 was enhanced significantly, and the initia...
2. A high voltage electrolyte and lithium ion battery using the same [Machine Translation].
Quick View
PatentPak
By Yang, Yongjun; Xu, Mengqing; Wan, Huaping; Zhan, Xiaoyun
From Faming Zhuanli Shenqing (2015), CN 104979589 A 20151014. | Language: Chinese, Database: CAPLUS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第一部分：文獻資料案例分享

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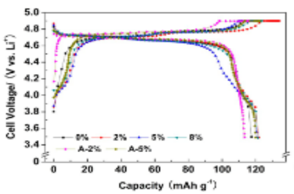
ACS文獻-以High voltage additive and lithium ion battery關鍵字為例

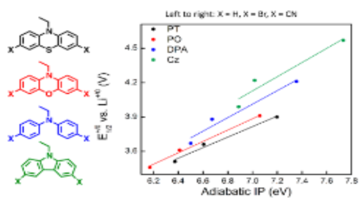
43. **Investigation of the Effect of Extra Lithium Addition and Post-annealing on the electrochemical performance of High-Voltage Spinel LiNi0.5Mn1.5O4 Cathode Material**
Quick View Other Sources
By Qian, Yunxian; Deng, Yuanfu; Wan, Lina; Xu, Hongjie; Qin, Xusong; Chen, Guohua
From Journal of Physical Chemistry C (2014), 118(29), 15581-15589. | Language: English, Database: CAPLUS



The $LiNi_{0.5}Mn_{1.5}O_4$ (LNMO) spinel is an attractive cathode candidate for next generation **lithium-ion batteries** as it offers **high** power and energy d. In this paper, the effects of extra amts. of **lithium** addn. and postannealing process on the physicochem. and electrochem. properties of the spherical LNMO material were investigated. The exptl. results show that the amt. of **lithium** and the post-annealing process have significant impacts on the Mn^{3+} content, phase impurity (rock-salt phase) and phase structures (Fd3m and $P4_332$) of the spherical LNMO cathode materials, so as their electrochem. perf...

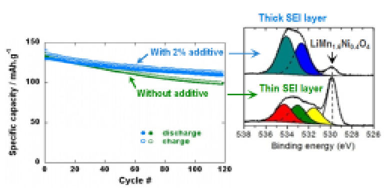
藉由圖表可快速簡單閱覽文章內容，篩選閱讀主題

45. **Controlling Oxidation Potentials in Redox Shuttle Candidates f**
Quick View Other Sources
By Ergun, Selin; Elliott, Corrine F.; Kaur, Aman Preet; Parkin, Sean R.; Odom, Susan A.
From Journal of Physical Chemistry C (2014), 118(27), 14824-14832. | Language: English, Database: CAPLUS



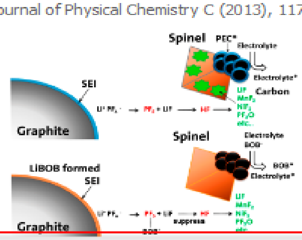
Overcharge, a condition in which cell **voltage** rises to undesirably **high** potentials, can be prevented in **lithium-ion batteries** by incorporating redox shuttles into the **battery** electrolyte. Although extensive overcharge protection has been demonstrated in **batteries** with $LiFePO_4$ cathodes, the redox shuttles that work in these **batteries** are incompatible with **higher voltage** cathodes. Designing stable **additives** with **higher** oxidn. potentials is necessary to protect **high voltage batteries** from overcharge. Toward that goal, diarylamines with varied structures, including fused heteroarom. ring system...

53. **Improvement of Electrode/Electrolyte Interfaces in High-Voltage Spinel Lithium-Ion Batteries by Using Glutaric Anhydride as Electrolyte Additive**
Quick View Other Sources
By Bouayad, H.; Wang, Z.; Dupre, N.; Dedryvere, R.; Foix, D.; Franger, S.; Martin, J.-F.; Boutafa, L.; Patoux, S.; Gonbeau, D.; et al
From Journal of Physical Chemistry C (2014), 118(9), 4634-4648. | Language: English, Database: CAPLUS



High-voltage spinel oxides combined with $Li_4Ti_5O_{12}$ result in 3 V **Li-ion batteries** with a **high** power capability, but electrochem. performances are limited by electrode/electrolyte interfacial reactivity at **high** potential. The authors have studied glutaric anhydride (GA) as an electrolyte **additive** to improve the performances of $LiNi_{0.4}Mn_{1.6}O_4/Li_4Ti_5O_{12}$ cells. GA efficiently reduces both the capacity fading upon cycling and the self-discharge. From XPS, NMR, and electrochem. impedance spectroscopy (EIS) measurements, GA reduces salt ($LiPF_6$) degrdn. Addn. of 2% GA in the electrolyte results in...

56. **Impact of Lithium Bis(oxalate)borate Electrolyte Additive on the Performance of High-Voltage Spinel/Graphite Li-Ion Batteries**
Quick View Other Sources
By Pieczonka, Nicholas P. W.; Yang, Li; Balogh, Michael P.; Powell, Bob R.; Chemelewski, Katharine; Manthiram, Arumugam; Krachkovskiy, Sergey A.; Goward, Gillian R.; Liu, Minghong; Kim, Jung-Hyun
From Journal of Physical Chemistry C (2013), 117(44), 22603-22612. | Language: English, Database: CAPLUS



The impact of **lithium** bis-(oxalate)-borate (LiBOB) electrolyte **additive** on the performance of full **lithium-ion** cells pairing the **high-voltage** spinel cathode with the graphite anode was systematically investigated. Adding 1 wt.% LiBOB to the electrolyte significantly improved the cycle life and Coulombic efficiency of the full-cells at 30 and 45 °C. As the LiBOB was preferentially oxidized and reduced compared with LiBOB-free electrolyte during cycling, their relative contributions to the improved capacity retention in full-cells was gauged by pairing fresh and LiBOB-treated electrodes with v...

文獻關鍵結構式彙整- 結構設計

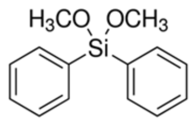
Dimethoxydiphenylsilane (DDS) as an electrolyte additive for high voltage Li-ion batteries

By: Mai, Shaowei; Xu, Mengqing; Xing, Lidan; Lia, Weishan

Electrochemistry (Tokyo, Japan)
Volume82 Issue12 Pages1052-1055
Journal 2014

The performance of the Li/$LiNi_{0.5}Mn_{1.5}O_4$ cells cycled to 5.0 V (vs. Li/Li^+) using 1.0 M $LiPF_6$-EC/DMC (1/1, vol./vol.) with and without dimethoxydiphenylsilane (DDS) at 25°C has been investigated. Cells with 1% DDS added deliver slightly lower initial discharge capacity than the cells with baseline electrolyte, 115.3 vs. 120.9 mAh g^{-1}. Electrochem. methods and ex-situ anal. techniques, including TGA and SEM, are employed to conduct the interfacial chem. of $LiNi_{0.5}Mn_{1.5}O_4$/electrolyte to better understand the improved electrochem. performances of the cells with introduction of DDS. The results indicate that DDS can be electro-oxidized and participates in the formation of the surface layer on cathode electrode, which prevents electrolyte from further decompn. and promotes Li^+ conduction of the cathode/electrolyte interphase, thus improves the electrochem. performances of Li/$LiNi_{0.5}Mn_{1.5}O_4$ cells.

6843-66-9

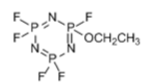


A novel fluorocyclophosphazene as bifunctional additive for safer lithium-ion batteries

By: Xia, Lan; Xia, Yonggao; Liu, Zhaoping

Journal of Power Sources
Volume278 Pages190-196
Journal; Online Computer File 2015

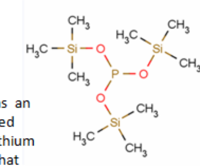
A high-efficiency flame-retarding additive, (Ethoxy)pentafluorocyclotriphosphazene ($N_3P_3F_5OCH_2CH_3$, PFPN), has been synthesized and explored as a safer protection additive for rechargeable lithium batteries. The flammability tests indicate that only the addn. of 5 wt% PFPN can make the electrolyte be totally non-flammable. As far as we know, the PFPN additive is the most efficient one of any flame-retarding additive ever synthesized and reported in the literature. The charge-discharge results demonstrate that the PFPN additive shows a good electrochem. compatibility on the graphitic anode and $LiCoO_2$ cathode. Meanwhile, the incorporated PFPN additive can greatly improve the cyclic performance of $LiCoO_2$ electrode at a high cut-off voltage of 4.5 V, showing a prospective flame-retarding additive for the applications in high-voltage lithium ion batteries.



Ethoxy(pentafluoro)cyclotriphosphazene（CAS Number：33027-66-6)

Tris(trimethylsilyl)phosphite as electrolyte additive for high voltage layered lithium nickel cobalt manganese oxide cathode of lithium ion battery

Electrochimica Acta
Volume147
Pages565-571
Journal; Online Computer File
2014



Tris(trimethylsilyl) phosphite (TMSPi) is reported as an effective electrolyte additive for high voltage layered lithium nickel cobalt manganese oxide cathode of lithium ion battery. Charge/discharge tests demonstrate that the cyclic stability and rate capability of LiNi1/3Co1/3Mn1/3O2 can be improved significantly by adding 0.5wt% TMSPi into a standard electrolyte, 1.0 M LiPF6 in ethylene carbonate/ dimethyl carbonate (1/2, in volume). The capacity retention of LiNi1/3Co1/3Mn1/3O2 is improved from 75.2% to 91.2% after 100 cycles at 0.5 C rate (1C = 160 mA g), while its discharge capacity at 5 C

整合文獻中具功效之添加劑結構式

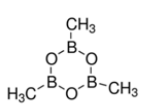
找出特殊官能基結構

新型添加劑結構設計

Anodic Decomposition of Trimethylboroxine as Additive for High Voltage Li-Ion Batteries

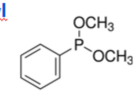
By: Freiberg, A.; Metzger, M.; Haering, D.; Bretzke, S.; Puravankara, S.; Nilges, T.; Stinner, C.; Marino, C.; Gasteiger, H. A.

Journal of the Electrochemical Society
Volume161
Issue14
PagesA2255-A2261
Journal; Online Computer File
2014
CODEN:JESOAN
ISSN:0013-4651
DOI:10.1149/2.0011501jes



Trimethylboroxine (TMB) is used as an additive in the electrolyte for improving the performance of $LiCoPO_4$ (LCP) in Li-ion batteries. In this work, the role and behavior of TMB are investigated by cyclic voltammetry (CV), impedance spectroscopy (EIS) and online electrochem. mass spectroscopy (OEMS). It was found that TMB oxidizes from 4.6 V and a low amt. in the electrolyte is necessary to obtain good performance. On one hand, its oxidn. produces boron trifluoride (BF_3), phosphorylfluoride (POF_3) and carbanion (CH_3^-) linked to a huge increase in impedance. Based on these results, a complete oxidn. mechanism is proposed. The catalytic effect of the TMB decompn. products on carbonate polymn. could enhance the performance of LCP. On the other hand, an unexplained water and/or HF release was detected. Further expts. need to be done.

Improving cyclic stability of lithium nickel manganese oxide cathode at elevated temperature by using dimethyl phenylphosphonite as electrolyte additive



By: Mai, Shaowei; Xu, Mengqing; Liao, Xiaolin; Xing, Lidan; Li, Weishan

Journal of Power Sources
Volume273
Pages816-822
2015

CAS Number 2946-61-4

A novel electrolyte additive, ***di-Me phenylphosphonite (DMPP)***, is reported in this paper to be able to improve significantly the cyclic stability of $LiNi_{0.5}Mn_{1.5}O_4$ cathode of high voltage lithium ion battery at elevated temp. When experiencing charge/discharge cycling at 50 °C with 1C (1C = 146.7 mAh g^{-1}) rate in a std. (STD) electrolyte (1.0 M $LiPF_6$ in ethylene carbonate (EC)/dimethyl carbonate (DMC), EC/DMC = 1/2 in vol.), $LiNi_{0.5}Mn_{1.5}O_4$ suffers serious discharge capacity decaying, with a capacity retention of 42% after 100 cycles. With adding 0.5% DMPP into the STD electrolyte, the capacity retention is increased to 91%. This improvement can be ascribed to the preferential oxidn. of DMPP to the STD electrolyte and the subsequent formation of a protective film on $LiNi_{0.5}Mn_{1.5}O_4$, which suppresses the electrolyte decompn. and protects $LiNi_{0.5}Mn_{1.5}O_4$ from destruction. Theor. calcns. together with voltammetric analyses demonstrate the preferential oxidn. of DMPP and the consequent suppression of electrolyte decompn., while the observations from SEM, X-ray photoelectronic spectroscopy and Fourier transform IR spectroscopy confirm the protection that DMPP provides for $LiNi_{0.5}Mn_{1.5}O_4$.

Bi-functional lithium difluoro(oxalato)borate additive for lithium cobalt oxide/lithium nickel manganese cobalt oxide cathodes and silicon/graphite anodes in lithium-ion batteries at elevated temperatures

By: Lee, Sung Jun; Han, Jung-Gu; Lee, Yongwon; Jeong, Myung-Hwan; Shin, Woo Cheol; Ue, Makoto; Choi, Nam-Soon

Electrochimica Acta;Volume137;Pages1-8 ;2014

Lithium difluoro(oxalato)borate (LiFOB) is investigated as an additive for enhancing the electrochem. performance of high-voltage lithium cobalt oxide ($LiCoO_2$, LCO)/lithium nickel manganese cobalt oxide ($LiNi_{0.6}Co_{0.2}Mn_{0.2}O_2$, NMC) cathodes and high-capacity silicon/graphite (Si-C) anodes. LCO-NMC/Si-C full cells with a LiFOB additive have been found to exhibit improved high temp. electrochem. performance. To confirm the effects of LiFOB on the cathode and the anode, the surface chem. of the anodes and cathodes cycled in electrolytes with and without the LiFOB additive are examd. using ex-situ XPS. The LiFOB additive produces a LiF-based solid electrolyte interphase (SEI) on the Si-C anode and a carboxylate-based SEI on the LCO-NMC cathode.

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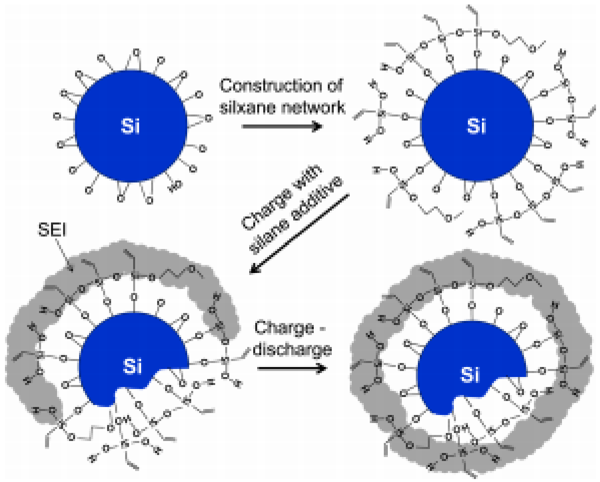
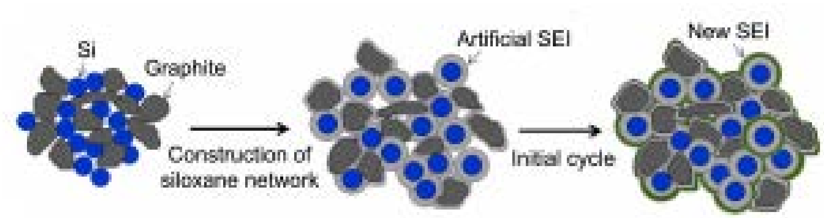
文獻中反應機制





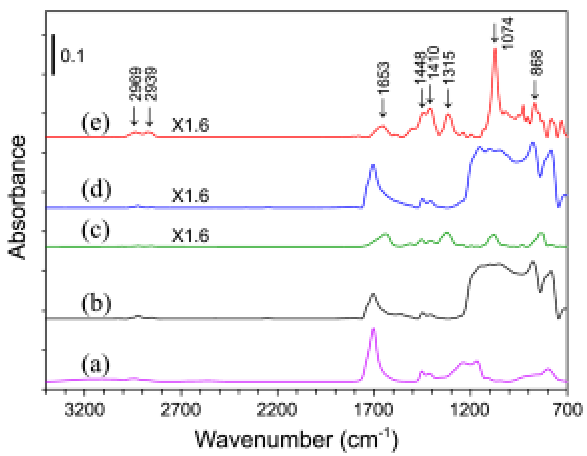


Figure 3. IR spectra for (a) polyacrylic acid binder, and the surface of (b) pristine Si electrode and (c) that after five cycles in the presence of TMVS additive, and (d) pristine Si electrode with an artificial SEI of siloxane network and (e) that after five cycles in the presence of TMVS.

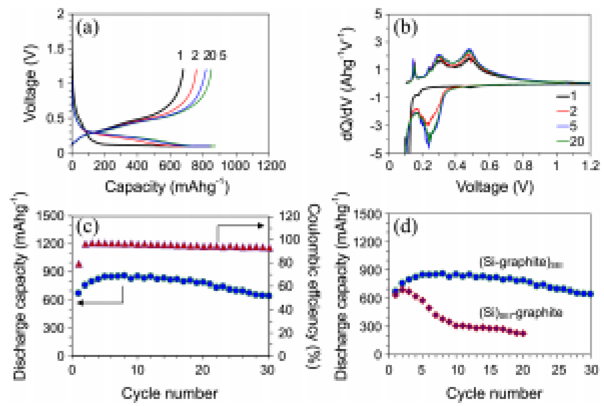
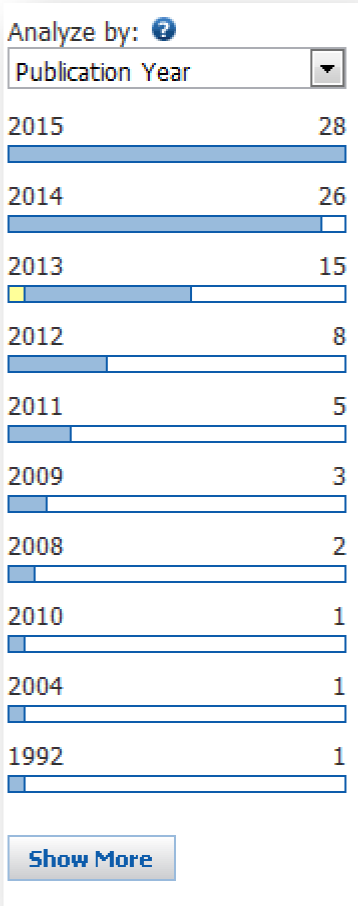
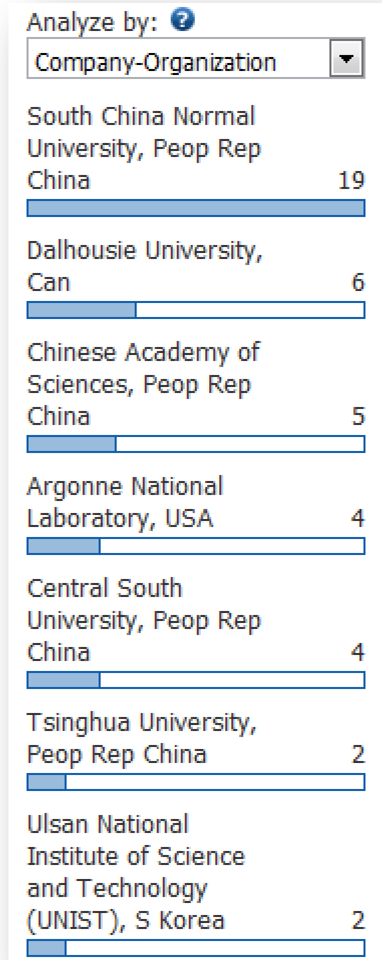
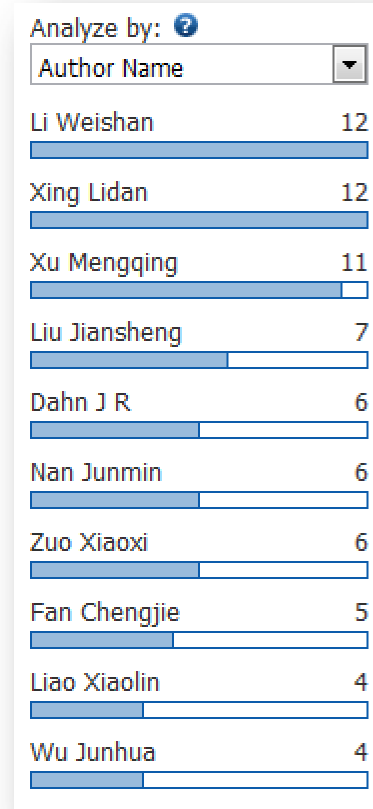


Figure 4. Voltage profiles (a), their differential capacity plots (b) and cycling ability of the lithium cells with (c) Si-graphite composite electrode with an artificial SEI, and (d) composite electrode consisting of Si with an artificial SEI and bare graphite in the presence of TMVS, as a function of cycle number.

合作夥伴 與 產學合作 機會?







藉由ACS 文獻資料庫，我們可以獲得什麼?

第二部分：專利資料案例分享

案例分享- 鋰電池添加劑A

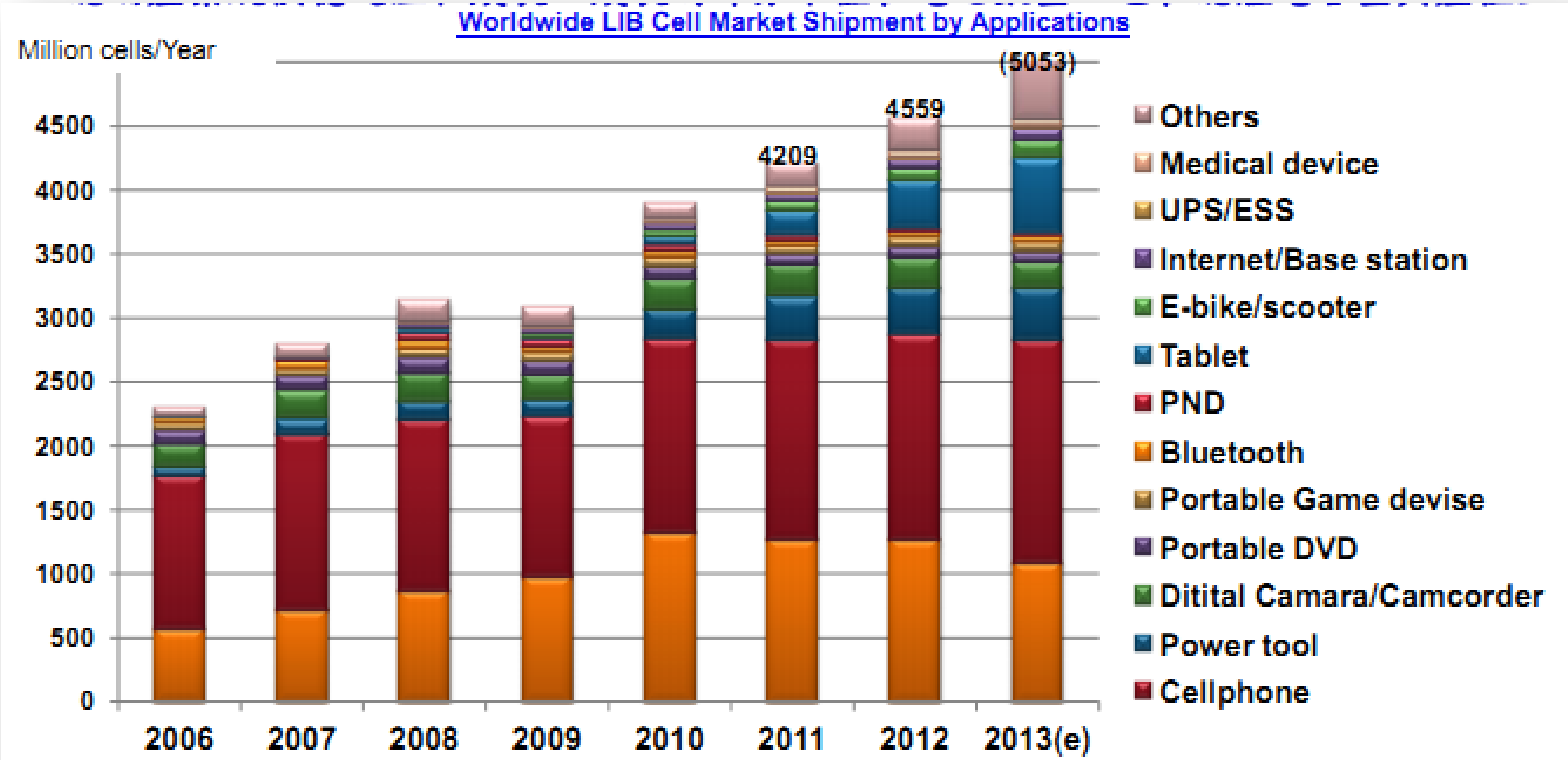
● 我們想知道的資訊：

1. 是否於新材料端，在電解液配方上有使用添加劑A?
2. 在高電位電解液配方，是否有使用?
3. 全球電池相關廠商使用狀況
4. 專利可佈局漏洞??

其實我們很幸運：全球鋰電池市場持續成長當中

□

2012 年電池芯產量成長率=8.3%, 2013第三季預估全年應可保持7%

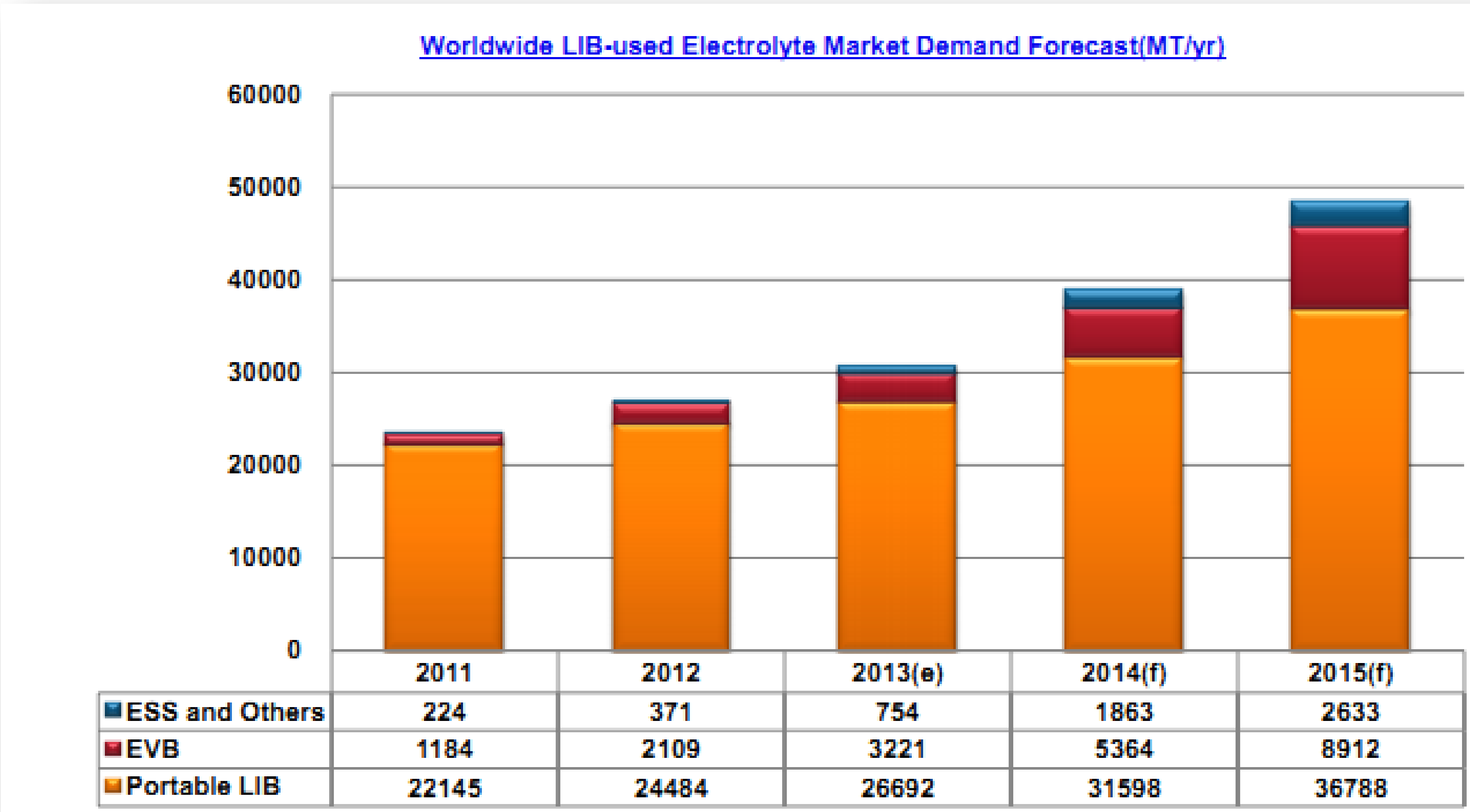


Source :201312 IEK電池年度回顧與展望研討會

電解液有望在2015年時具備近5萬公噸年出貨規模

2012 ：需求數量達29,164MT/yr, IT:EV:ESS=100:10:1

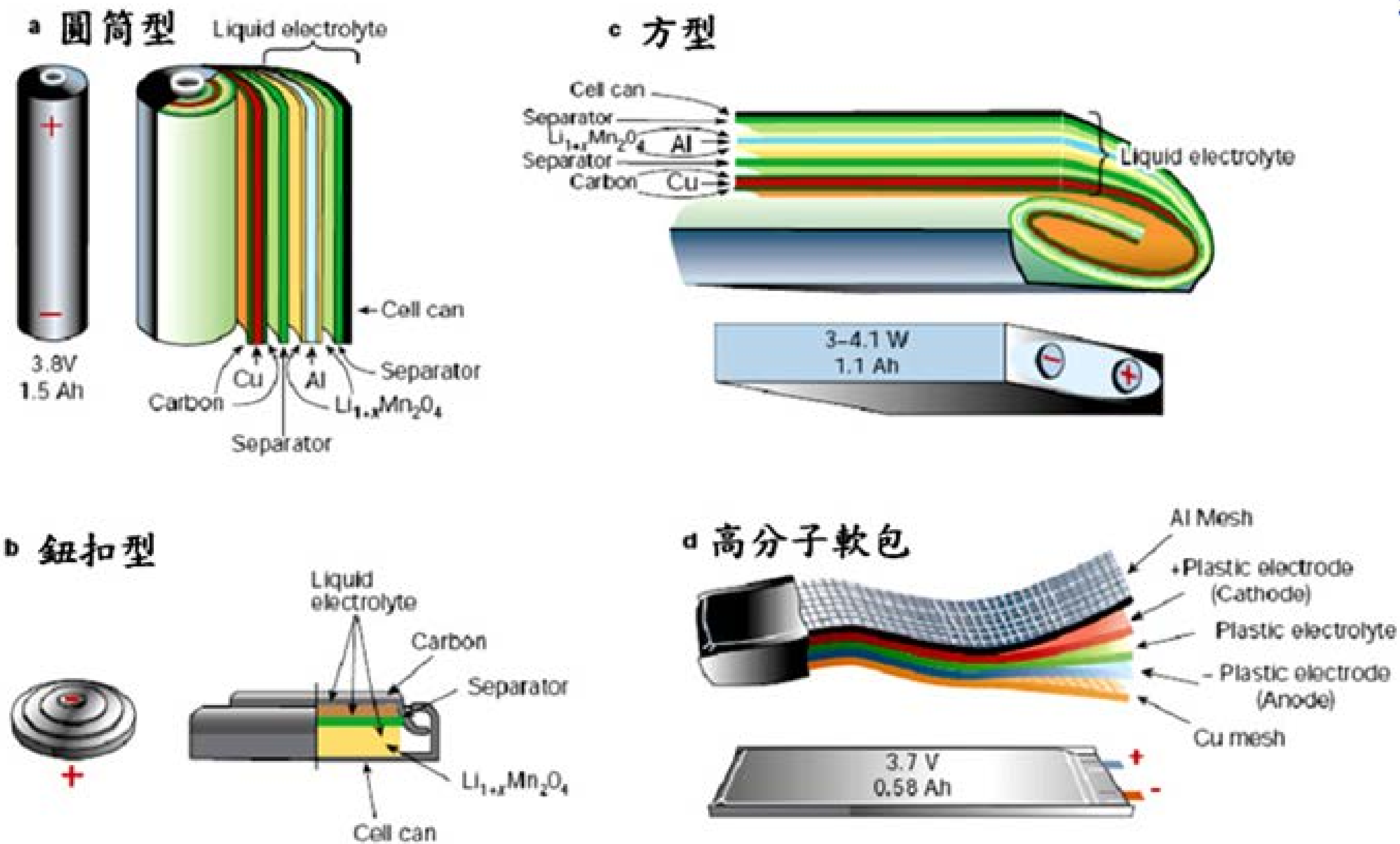
- 50,000 MT in 2015, Almost **10 billion USD** market in 2015



	2011	2012	2013(e)	2014(f)	2015(f)
ESS and Others	224	371	754	1863	2633
EVB	1184	2109	3221	5364	8912
Portable LIB	22145	24484	26692	31598	36788

Source :201312 IEK電池年度回顧與展望研討會

電池類型


a 圓筒型
Liquid electrolyte
3.8V
1.5 Ah
Cell can
Cu
Al
Separator
Carbon
$Li_{1+x}Mn_2O_4$
Separator
c 方型
Cell can
Separator
$Li_{1+x}Mn_2O_4$
Al
Separator
Carbon
Cu
Liquid electrolyte
3–4.1 W
1.1 Ah
b 鈕扣型
Liquid electrolyte
Carbon
Separator
$Li_{1+x}Mn_2O_4$
Cell can
d 高分子軟包
Al Mesh
+Plastic electrode (Cathode)
Plastic electrolyte
- Plastic electrode (Anode)
Cu mesh
3.7 V
0.58 Ah

電池功效性分類

高電位應用

高溫壽命

低溫壽命

產氣抑制

第一步先建立資料彙整模板-範例

◆ 建立表格

專利號	公司	電池型態	電解液型態	正極材料	負極材料	高溫	低溫	產氣	電位
JP12345678	NEC	18650	L	NMC	AG	V	V		4.2V
CN23458765	LG	Prismatic	G	LCO	NG	V	V	V	4.3V
US1547895	Sony	Laminate	G	LFP	AG	V		V	4.35V

Priority Date - Earliest	Assignee/Applicant	編號	專利號	膠態/液態 (G/L)	全電池型態	正極	負極	高溫	低溫	產氣	高電壓	配方	備註
2011-02-28	SHOWA DENKO K.K.,JP | HASATANI Akio,JP | IRIE Koji,JP | SHISHIKURA Toshikazu,JP	101	WO2012117852A1			LMO/LCO/NMC/LFP	AG	V	V		4.2V	V	
2004-12-27	UBE INDUSTRIES LTD.	28	KR1269779B1	L	cylindrical battery	NMC	AG	V	V		4.4	V	dicarbonyl compound
2004-12-27	UBE INDUSTRIES LTD.,JP	29	WO2006070546A1	L	cylindrical battery	NMC	AG				4.2	V	dicarbonyl compound
2006-09-21	UBE IND LTD,JP	47	JP05070780B2	L	cylindrical battery	NMC	AG				4.35V/4.2V	V	以IL為鹽類搭配
2006-11-08	UBE INDUSTRIES,JP	51	CN101535237A	L	cylindrical battery	NMC	AG				4.2V	V	
2007-03-29	TDK CORP,JP	54	JP05109441B2	G	prismatic battery	NMC	AG				4.2V	V	搭配132-DIOXA THIOLANE-2,2-DIOXIDE
2008-04-02	Ube Industries Ltd,JP	67	IN201006228P4	L	cylindrical battery	NMC	AG	V		V	4.2	V	carboxylate ester compound
2011-04-12	UBE INDUSTRIES LTD.,JP | ABE Koji,JP | SHIMAMOTO Kei,JP	104	WO2012141270A1	L	coin cell	NMC	AG	V			4.3V	V	有機磷化學
2009-10-01	Samsung SDI Co. Ltd	81	US8435680B2	L	prismatic battery	NMC/LCO	AG	V	V	V	4.2V	V	重要
2008-04-02	UBE INDUSTRIES LTD.,Ube-shi, Yamaguchi,JP	68	US20110045361A1	L	cylindrical battery	NMC/LFP	AG	V		V	4.3V/3.6V	V	重要
2003-09-17	UBE INDUSTRIES LTD.,JP	19	WO2005029631A1	L	cylindrical battery	NMC+LCO	AG				4.2	V	oxy compound, vinylene carbonate and/or 1-
2008-07-01	BRIDGESTONE CORP	69	JP2010015719A	L		其他(LiMn0.9Co0.1O2)	AG	V			4.5V	V	難燃性添加劑有加入(重要)
2007-02-15	SONY CORP	53	JP2008198542A	L	cylindrical battery	其它(LFP/LiMn0.7Fe0.3PO4)	AG				4.2V	V	High C rate 搭配PS與PES

Priority Date - Earliest	Assignee/Applicant	編號	專利號	膠態/液態 (G/L)	全電池型態	正極	負極	高溫	低溫	產氣	高電壓	配方	備註
2007-02-15	SONY CORP	53	JP2008198542A	L	cylindrical battery	其它(LFP/LiMn0.7Fe0.3PO4)	AG				4.2V	V	High C rate 搭配PS與PES
2002-08-21	MITSUBISHI CHEM CORP,JP	12	JP04945879B2	L	Laminate	其它(LiCoO2/LiNi0.82Co0.15AL0.03O2)	AG	V		V	4.2	V	sulfone compounds and fluorine-containing
2006-10-02	NEC ENERGY DEVICES LTD	48	JP2012248544A	G		LCO	Amophous carbon				4.3V	V	MMDS取代PS
2002-06-11	NEC Corporation,Tokyo,JP	9	US7419747B2	L		LMO	Amophous carbon				4.2V	V	加錯合物金屬離子
2003-02-21	NEC CORP,JP	13	JP04352719B2	L	coin cell	LMO	Amophous carbon				4.2V	V	錯位添加劑
2004-02-13	NEC CORP,JP	21	JP04433163B2	L	coin cell	LMO	Amophous carbon				4.2V	V	有提到4.5V適合添加劑(重要)
2004-12-10	NEC CORP,JP	25	JP04968614B2	L	coin cell	LMO	Amophous carbon				4.2V	V	
2004-12-16	NEC CORP,JP	27	JP04968615B2	L	coin cell	LMO	Amophous carbon				4.2V	V	以PS為基本配方
2011-08-03	HITACHI VEHICLE ENERGY LTD.,JP | ABE Toshio,JP | OKUMURA Takefumi,JP | INOUE Ryo,JP	110	WO2013018212A1	L	cylindrical battery	NMC	Amophous carbon	V			4.2V	V	抑制HF產生(重要)
2003-07-25	NEC CORP,JP	15	JP04525018B2	L		LMO	Amorphous carbon				4.2V	V	
2009-12-25	NISSAN MOTOR CO LTD | AIR PRODUCTS & CHEMICALS INC	85	JP2011134690A	L	Laminate	LFP	HC	V			3.6V	V	主要探討不同鹽類與不銹鋼基材
2006-10-20	LG CHEM. LTD.	49	KR1190463B1	L	cylindrical battery	LMO	HC	V			4.2	V	ester or aldehyde structured terephthalate gro
2010-12-27	NEC CORP	95	JP2011096672A	L	coin cell	(LiNi0.5Mn1.37Ti0.13O4 與LiNi0.5Mn1.	HC	V			4.75V	V	重要
2010-10-26	DAINIPPON PRINTING CO LTD	94	JP2012094353A	L	coin cell	LCO	LTO				4.2		
2011-02-09	SAMSUNG SDI CO. LTD.,Yongin-si,KR	100	US20120202125A1	L	cylindrical battery	LCO	LTO	V				V	OCV變化(重要)
2006-05-31	GS YUASA CORPORATION KK	39	JP2007323958A	L	prismatic battery	NMC	LTO			V	4.1V	V	

研究員/專利工程師分工合作

關鍵字搜尋

- 利用專利搜尋工具進行專利搜尋
- （專利工程師）**(1~3天)**

人工歸類

- 分工人工閱讀專利內容，並歸類討論
- （專利工程師與研發人員）（~30天）

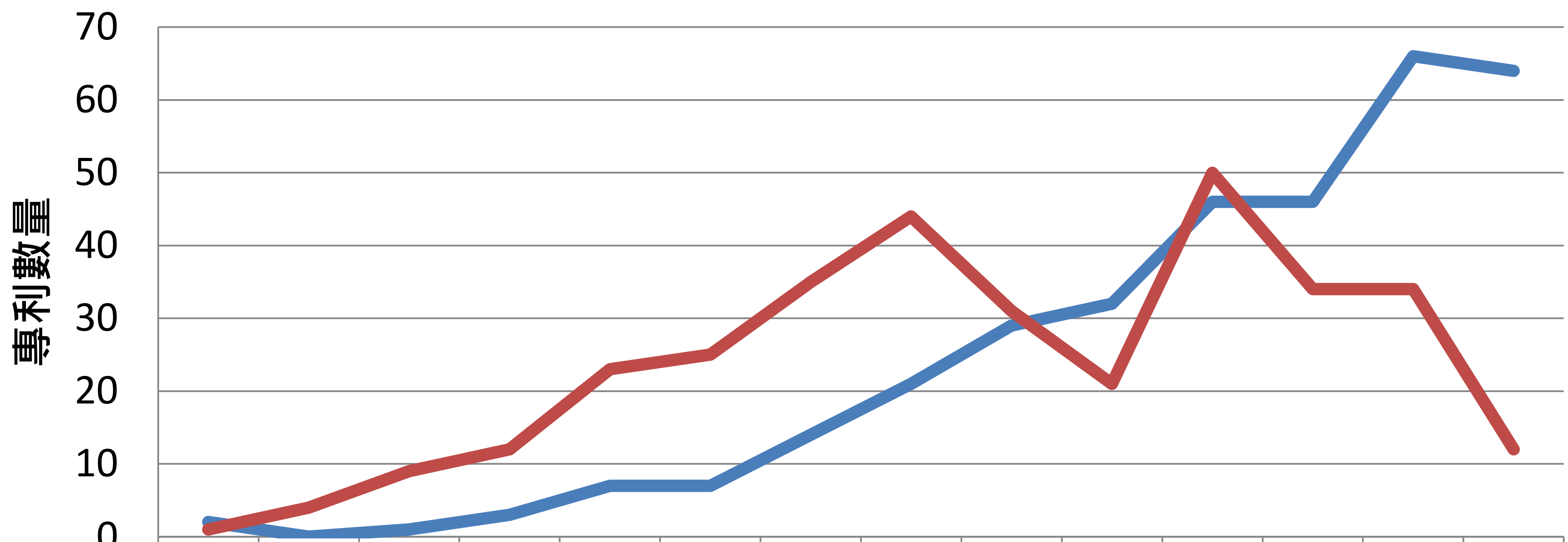
綜合討論

- 依專利地圖彙整討論（~20天）
- （專利工程師、研發人員 與 行銷人員）

由專利地圖中可以看到哪些資訊?

添加劑A應用在鋰電池趨勢

近10年申請/公開趨勢

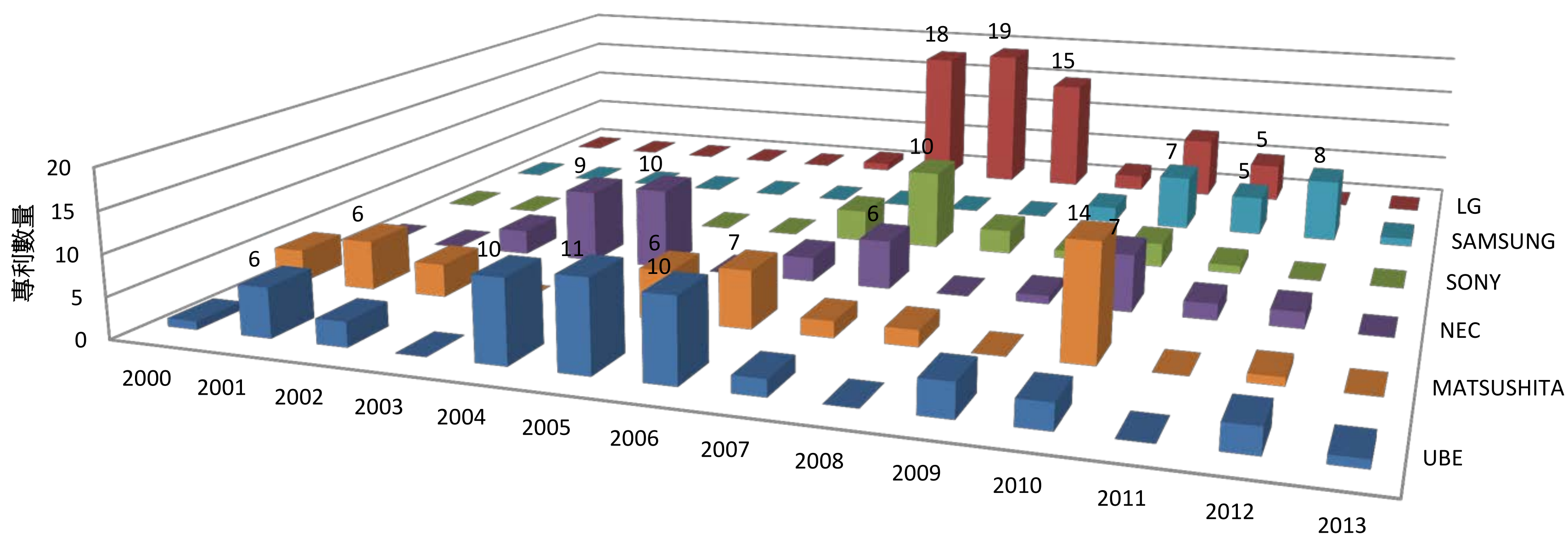


	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
公開	2	0	1	3	7	7	14	21	29	32	46	46	66	64
申請	1	4	9	12	23	25	35	44	31	21	50	34	34	12

HOPAX

添加劑A應用在鋰電池趨勢

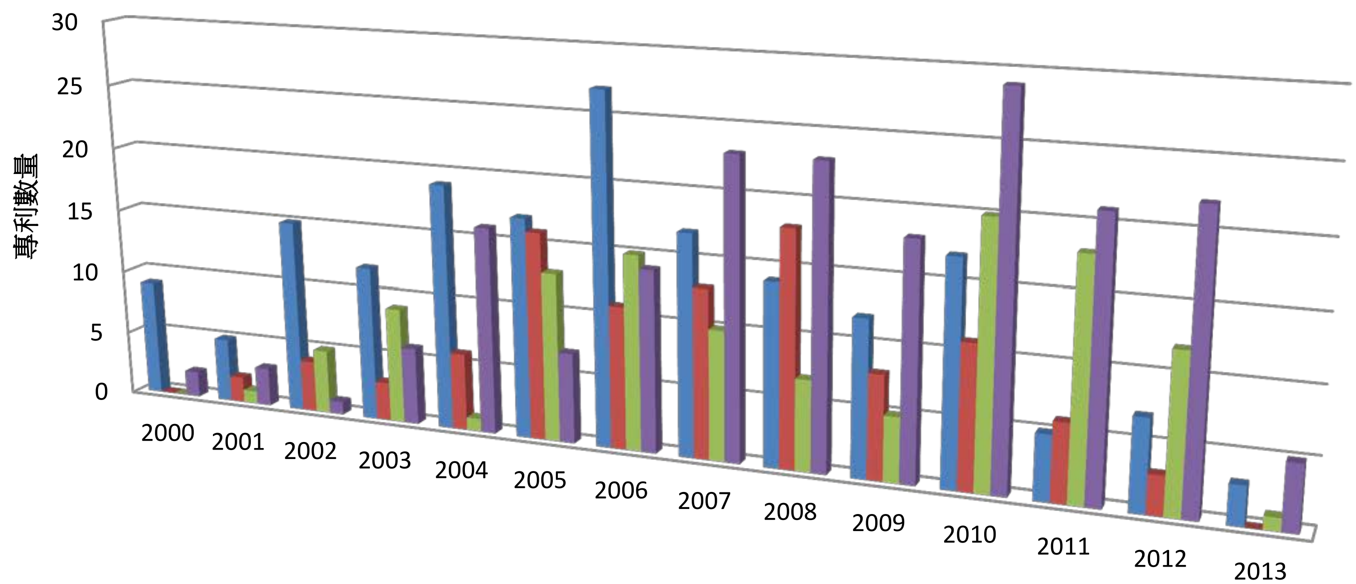
主要申請人歷年專利比較



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
UBE	1	6	3	0	10	11	10	2	0	4	3	0	3	1
MATSUSHITA	4	6	4	0	1	6	7	2	2	0	14	0	1	0
NEC	0	0	3	9	10	0	3	6	0	1	7	2	2	0
SONY	0	0	0	0	0	0	4	10	3	1	3	1	0	0
SAMSUNG	0	0	0	0	0	0	0	0	0	2	7	5	8	1
LG	0	0	0	0	0	1	18	19	15	2	8	5	0	0

添加劑A 應用在鋰電池趨勢

各國近10年專利申請趨勢



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
JP	9	5	15	12	19	17	27	17	14	12	17	5	7	3
KR	0	2	4	3	6	16	11	13	18	8	11	6	3	0
US	0	1	5	9	1	13	15	10	7	5	20	18	12	1
CN	2	3	1	6	16	7	14	23	23	18	29	21	22	5

添加劑A應用在鋰電池的生命周期

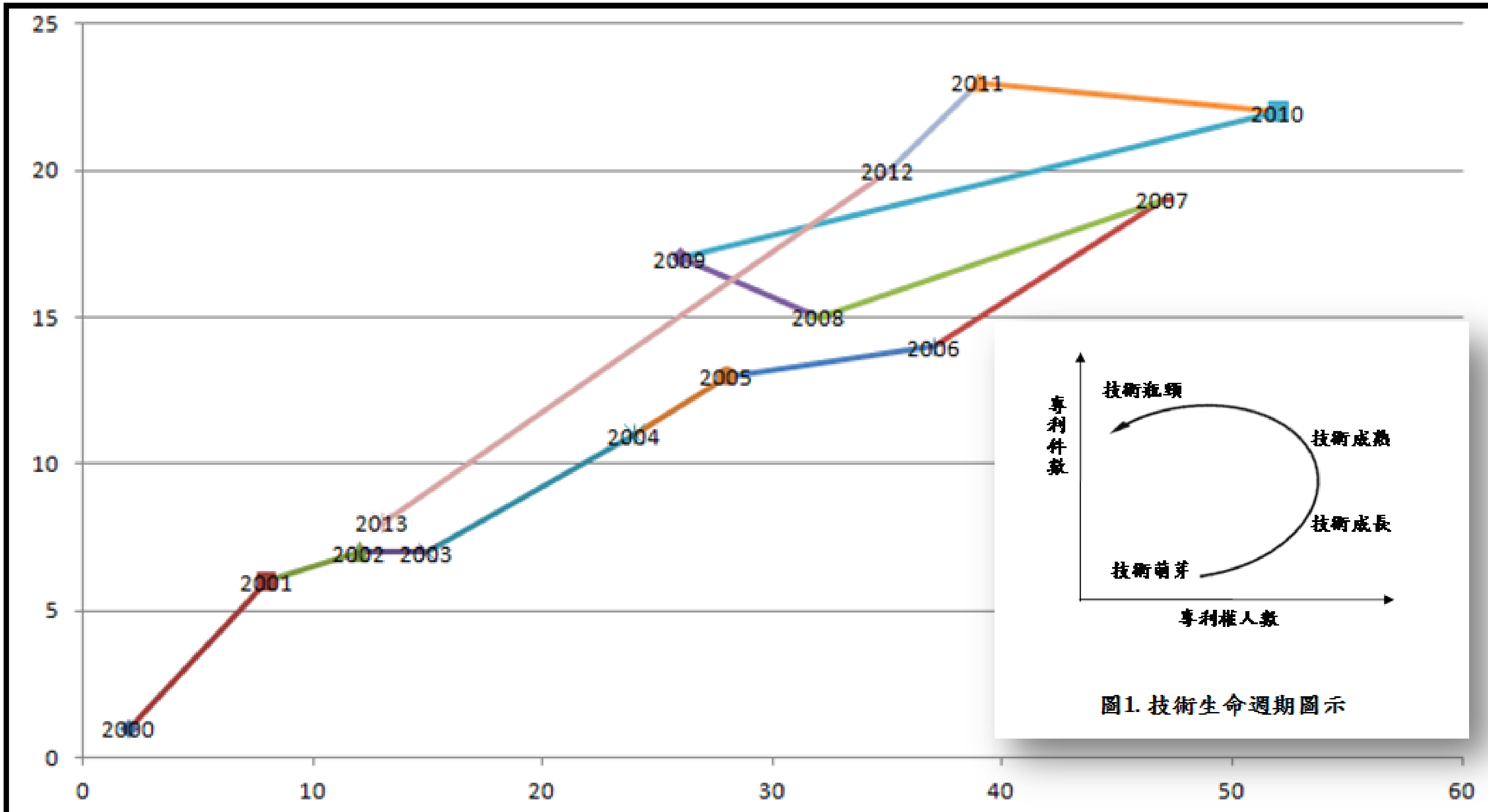


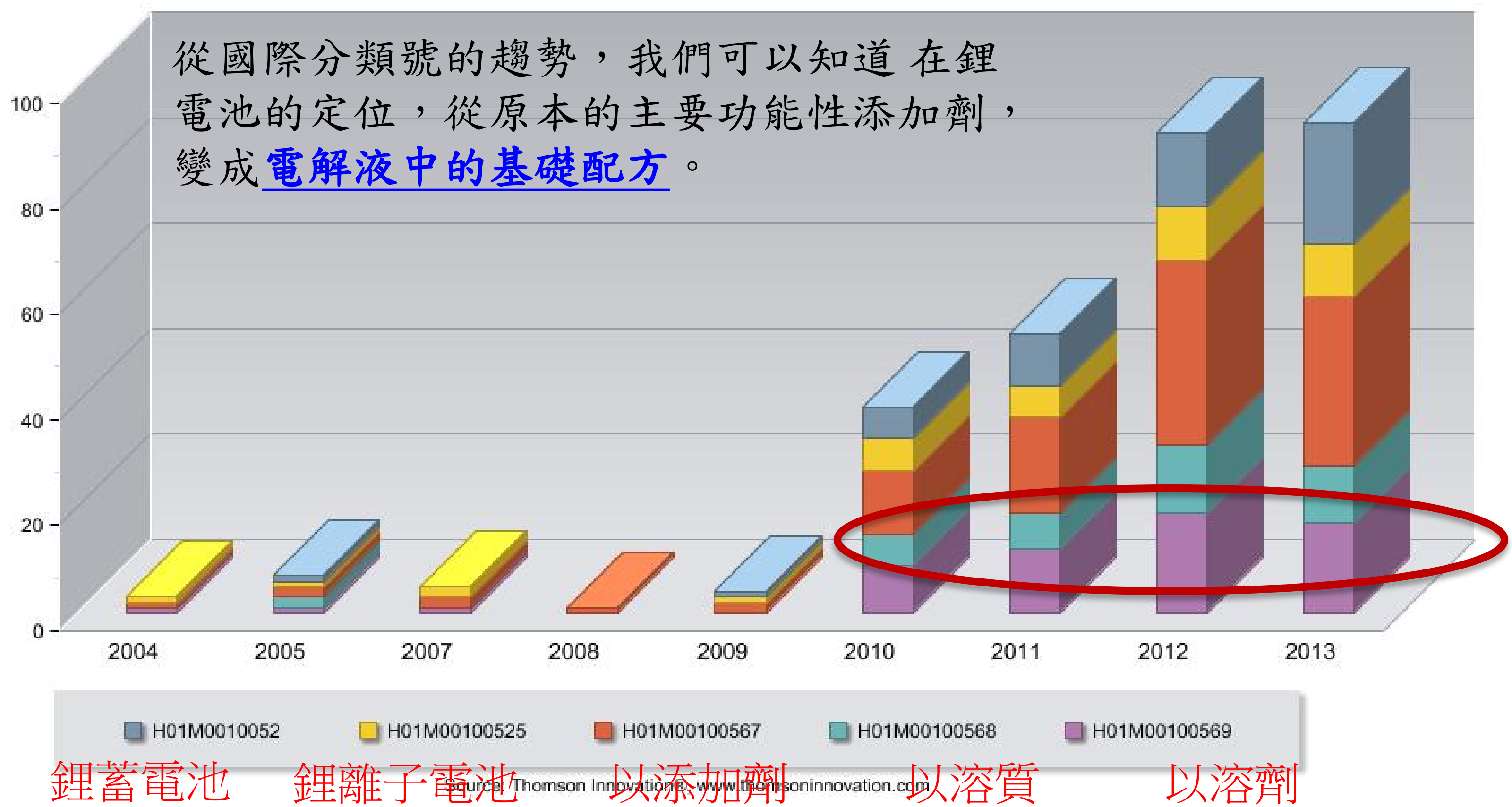
圖1. 技術生命週期圖示

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
專利件數	2	8	12	15	24	28	37	47	32	26	52	39	35	13
專利權人(公司)	1	6	7	7	11	13	14	19	15	17	22	23	20	8

添加劑A應用在鋰電池國際分類的公開趨勢

Top IPCs by Year

從國際分類號的趨勢，我們可以知道 在鋰電池的定位，從原本的主要功能性添加劑，變成<u>**電解液中的基礎配方**</u>。



鋰蓄電池　鋰離子電池　以添加劑為特徵　以溶質為特徵　以溶劑為特徵

針對添加劑A所使用的正極材料(指標性公司)

	高溫	低溫	產氣	電壓(>4.2V)
LCO(32篇)	32、34、42、43、50、58、59、63、86 81、89、90、100、118、115 41、44、61、77 31、33、37、66 23	57、58、59 115 1	42、50、63 89、118 61	115 48 33
LFP(2篇)	68	84	68	
LMO(13篇)	49、38	1		
NMC(15篇)	28、67、68、104、105 33、37、65、66 81	28、105 81	67、68 81	47、68、104 33
其他(9篇)	52、95 55 78	78、91	74、78、88、91	95、107

□:LG　□:Samsung　□:Sony　□:NEC　□: MATSUSHITA　□:Ube

年份	編號	年份	編號	年份	編號	年份	編號
1997	1	2003	13~19	2007	52~62	2011	99~117
1999	2	2004	20~30	2008	63~72	2012	118~125
2001	3~6	2005	31~36	2009	73~85		
2002	7~12	2006	37~51	2010	86~98		

針對添加劑A 所使用的負極材料 (指標性公司)

	高溫	低溫	產氣	電壓(>4.2V)
AG(26 篇)	34、42、43、50、58、59、63、86 23、28、67 89、115 44	57、58、59 81、115 28	42、50、63 81、89 67	47、68、104 115
NG(10 篇)	33、37、65、66、78 89、118 38、41、105	1、105 78	78、91 89、118	33 107
Amophous carbon (7 篇)				21、48
HC(2 篇)	49、95			95
MCMB(1 篇)	32			
LTO(1 篇)	100			
其他(12 篇) Si or SiO2 or 金屬鋰	55、61、77 31、52		74、88 61	

□:LG □:Samsung □:Sony □:NEC □: MATSUSHITA □:Ube

年份	編號		年份	編號		年份	編號		年份	編號
1997	*1*		2003	*13~19*		2007	*52~62*		2011	*99~117*
1999	*2*		2004	*20~30*		2008	*63~72*		2012	*118~125*
2001	*3~6*		2005	*31~36*		2009	*73~85*			
2002	*7~12*		2006	*37~51*		2010	*86~98*			

針對添加劑A所使用的電池型態 (指標性公司)

	高溫	低溫	產氣	電壓 (>4.2V)
coin cell (12 篇)	58 104 95	1、84、105 57、58		104 95
cylindrical battery (24 篇)	23、28、67、68 89、90、100、115 41、44、77 43、49 31、33	28 115	67、68 89	47、68 115 33
Laminate (14 篇)	37、65、66 41、55 118	?	118 88	107
Prismatic battery (12 篇)	32、34、42、50、59、63、86 61、78、81	78、91 59、81	42、50、63 74、78、91 61、81	?
其他(5 篇)				48

:LG :Samsung :Sony :NEC : MATSUSHITA :Ube

年份	編號	年份	編號	年份	編號	年份	編號
1997	*1*	2003	*13~19*	2007	*52~62*	2011	*99~117*
1999	*2*	2004	*20~30*	2008	*63~72*	2012	*118~125*
2001	*3~6*	2005	*31~36*	2009	*73~85*		
2002	*7~12*	2006	*37~51*	2010	*86~98*		

機會

針對添加劑A所使用的電解液型態 (指標性公司)

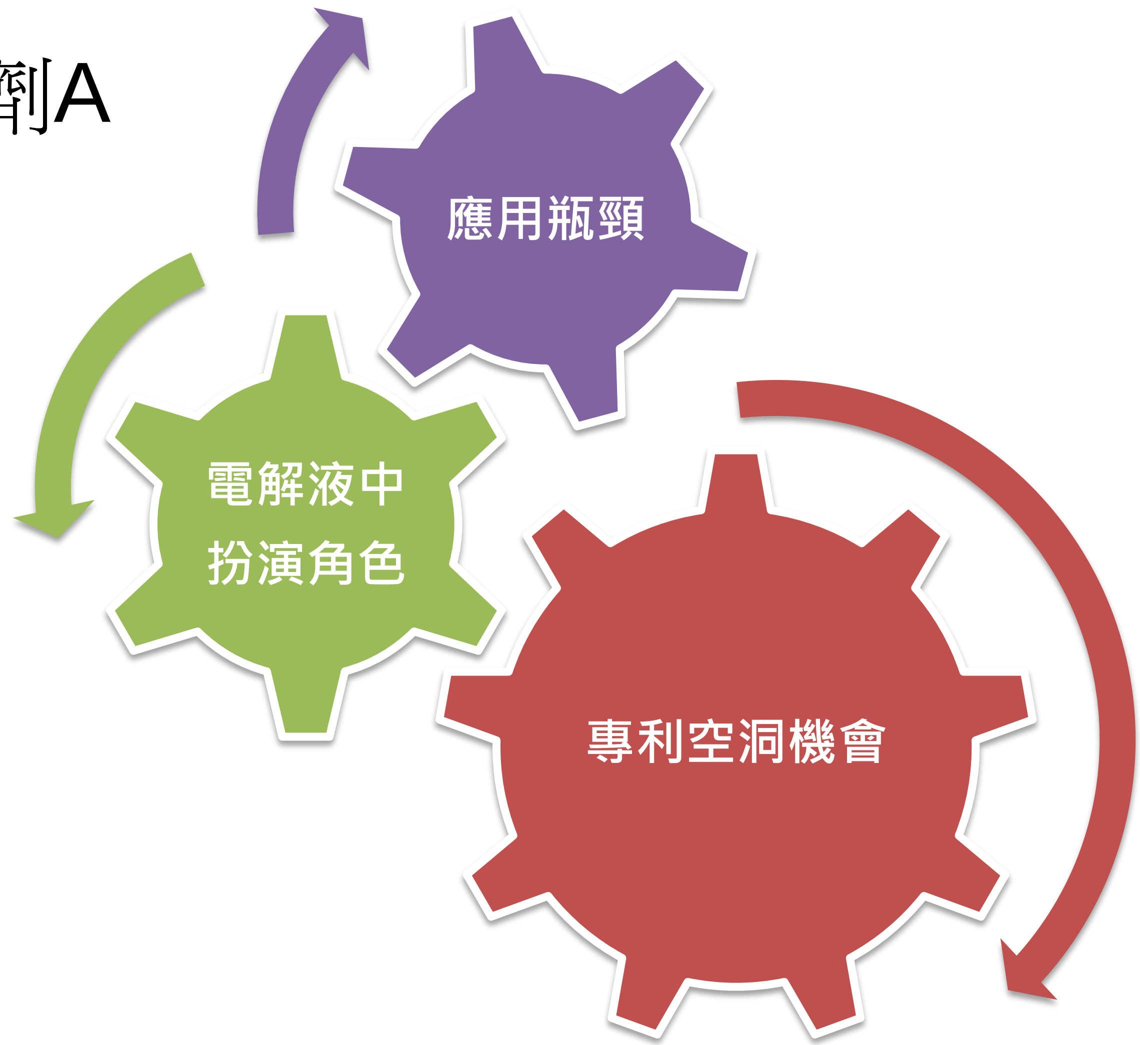
	高溫	低溫	產氣	電壓(>4.2V)
液態電解液 (58 篇)	32、34、42、43、49、50、58、59、63、86 23、28、67、68、104、105 33、37、65、66、78 41、44、55、61、77、 81、89、90、100、115、 52、95	1、28、84、105 57、58、59 78、91 81、115	42、50、63、 67、68 78、91 81、89 61	47、68、104 95、107 33 115
膠態電解液 (7 篇)	31 118		74、88 118	48

:LG :Samsung :Sony :NEC : MATSUSHITA :Ube

年份	編號		年份	編號		年份	編號		年份	編號
1997	*1*		2003	*13~19*		2007	*52~62*		2011	*99~117*
1999	*2*		2004	*20~30*		2008	*63~72*		2012	*118~125*
2001	*3~6*		2005	*31~36*		2009	*73~85*			
2002	*7~12*		2006	*37~51*		2010	*86~98*			

藉由專利地圖，我們可以獲得什麼?

- 添加劑A



Thanks for your attention!!