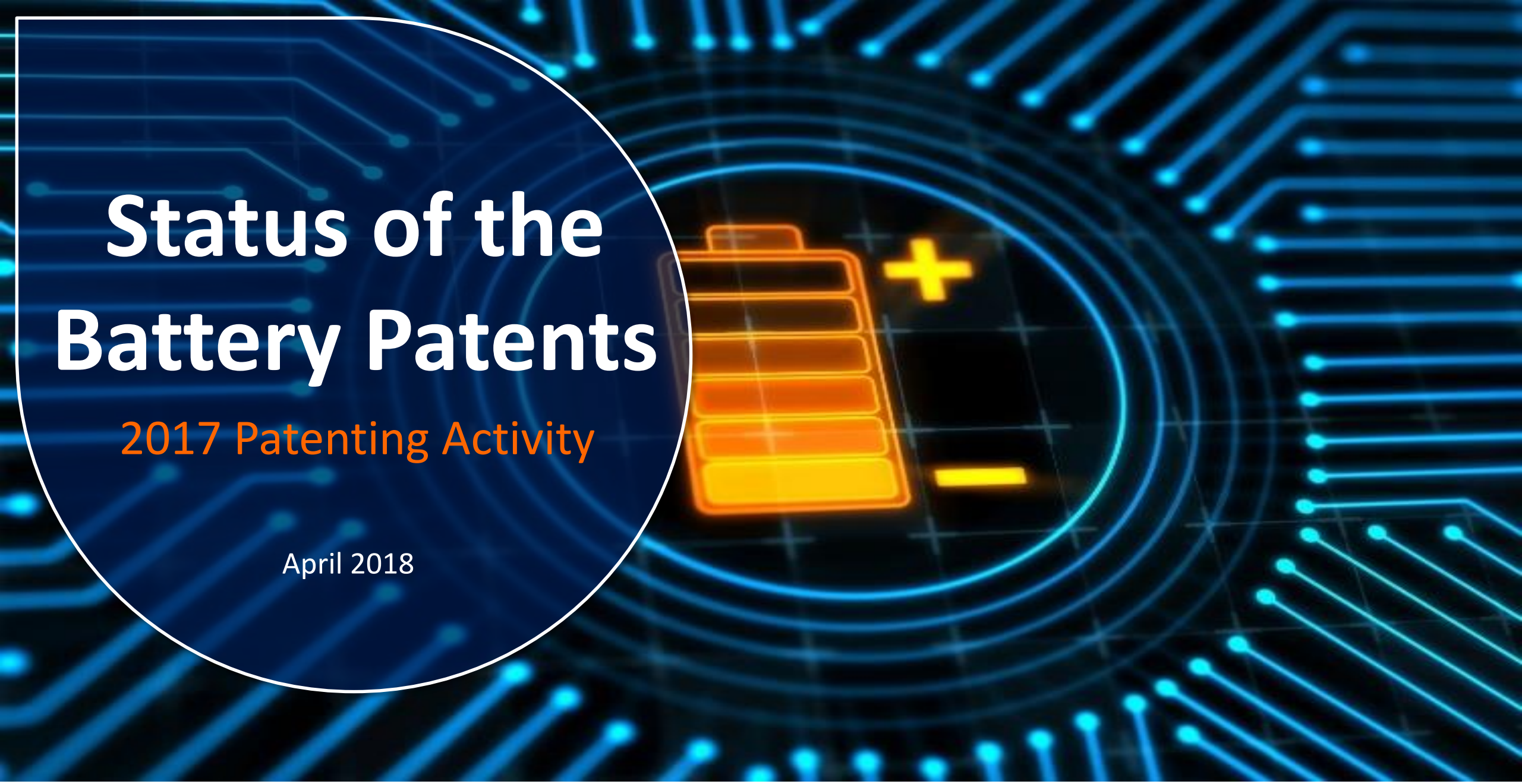
Status of the Battery Patents

2017 Patenting Activity

April 2018



KnowMade
Patent & Technology Intelligence

TABLE OF CONTENTS

SCOPE OF THE REPORT

- This report provides a detailed picture of the **2017 patenting activity for Battery technologies.**
- This report covers **worldwide patents published, granted or expired in 2017.**
- We have selected and analyzed more than **65,000 patent families** relevant to the scope of this report. In 2017, more than 30,400 new patent families have been published, >30,900 patents have been granted and >6,400 patents have expired.

Included in the report

- Patents with an earliest publication date in 2017.
- Patents granted in 2017.
- Patents expired or revoked in 2017.

- Patents related to batteries:
  - All battery technologies (Li-ion, Lead-acid, Ni-MH, Redox flow, Na-ion, Mg-ion, Li-Air, Li-S etc.).
  - Battery components (materials, electrodes, electrolytes, separators etc.).
  - Battery cells.
  - Battery packs and systems.
  - Thermal management systems in batteries.
  - Battery Management Systems.

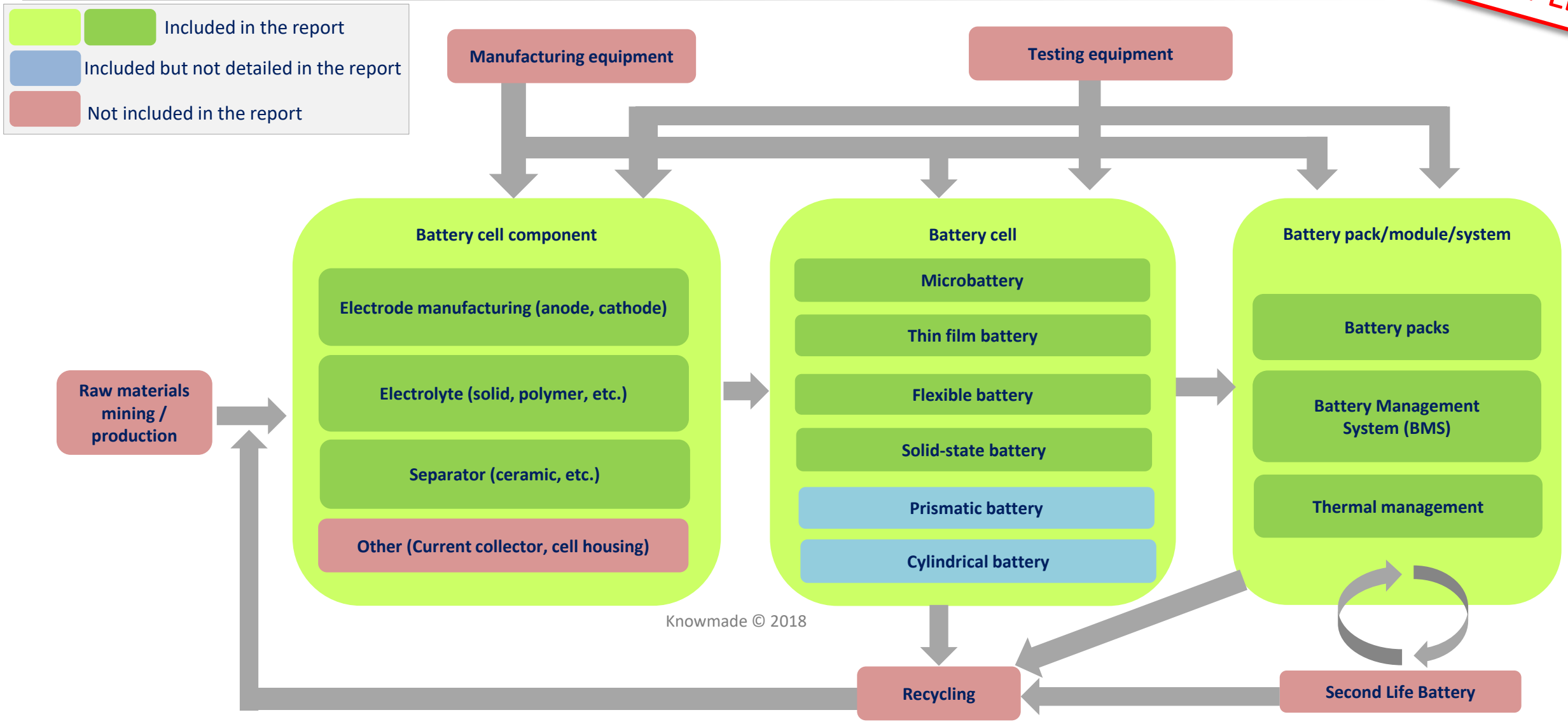
Not included in the report

- Patents without an earliest publication date in 2017 or a grant date in 2017 or an expiration/revocation date in 2017.

- Patents related to:
  - Devices comprising a battery without battery detailed description.
  - Battery recycling.
  - Raw materials mining / production (i.e. Lithium, Cobalt, Nickel etc.).
  - Manufacturing equipment.
  - Testing equipment.

SCOPE OF THE REPORT

General supply chain for batteries

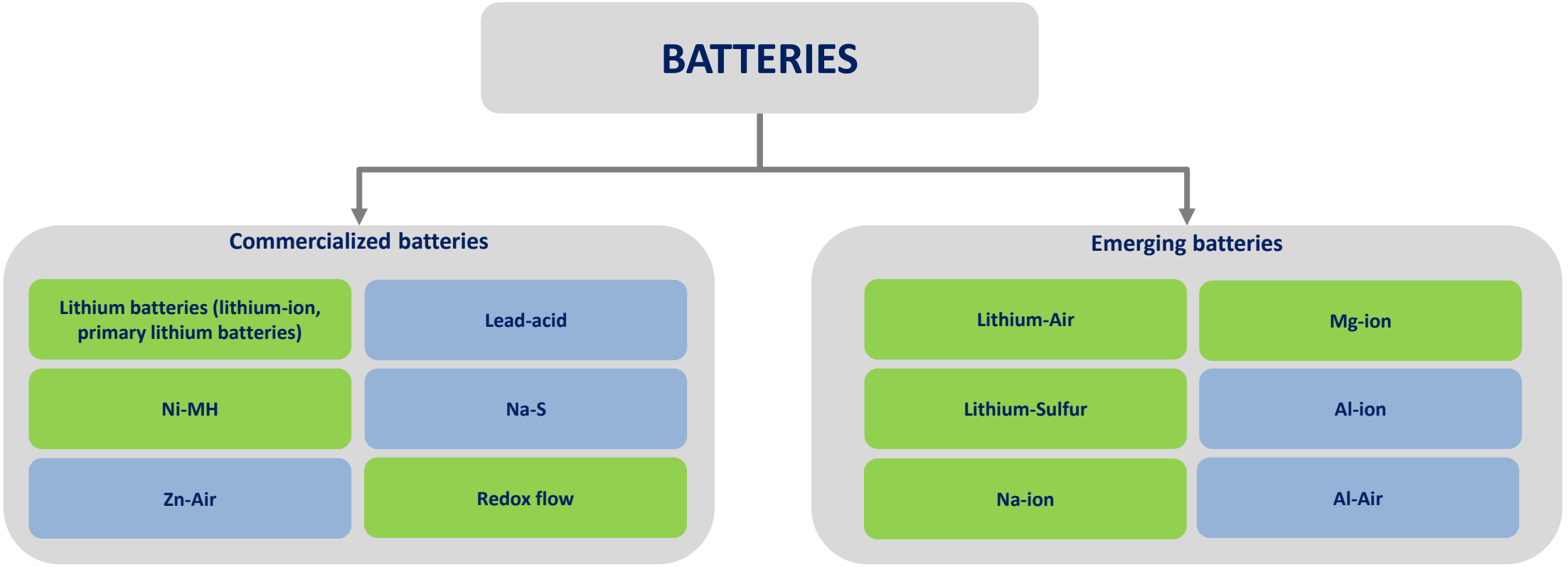


SCOPE OF THE REPORT

Battery technologies

Included in the report

Included but not detailed in the report



KEY FEATURES OF THE REPORT (1/2)

- The report provides **essential patent data** for **Battery-related patents** newly **published**, **granted** or **expired in 2017.**

- The report includes:

❖**Categorization of patents**
- By **supply chain segment** (*electrolyte, separator, electrode, cell, pack/system*)
- By **battery technology** (*Li-ion, Ni-MH, Redox Flow, Li-Air, Li-S, Na-ion and Mg-ion*).

❖**1997-2017 worldwide IP dynamics** by supply chain segment and battery technology

❖Overview of the **2017 worldwide patenting activity** for each supply chain segment and each battery technology
- New **patent applications**
- New **granted** patents
- **Expired** or **revoked** patents

❖Ranking of **main patent applicants** by supply chain segment and battery technology
- For 1997-2017 period
- For patents published in 2017
- For patents granted in 2017
- For patent expired in 2017

❖**Noticeable patents** newly published, granted or expired in 2017
- For **battery cells morphology** (*microbatteries, flexible batteries, solid-state batteries*)
- For **battery technologies** (*Li-ion, Ni-MH, Redox Flow, L-Air, Li-S, Na-ion, Mg-ion*)
- For **electrode materials of Li-ion battery** (*lithium, silicon, LTO, graphene, NMC, LCO, LFP, NCA, LMO*)

❖Main development trends **by battery technology**

❖Noteworthy 2017 news on **patent litigation**

KEY FEATURES OF THE REPORT (2/2)

- The report also provides an extensive **Excel database** containing >40,900 patent families of the **main patent assignees** and related to **the key battery technologies**.
  - Patent assignees included in the Excel file: LG Chem, Samsung, Toyota, Panasonic/Sanyo, GS Yuasa, Shenzhen Optimum Battery, Toshiba, Nissan, Hitachi, Sumitomo, Bosch, Zeon, TDK, Umicore, BASF, Sekisui Chemical, Hyundai, Tianneng Battery, Soulbrain, Asahi Kasei, Amperex, Toray industries, BAIC, Sinoev Technologies, BYD, Ford, Denso, Honda, BMW, Damiler, Porsche, General Motors, Renault, Ube Industries, SK Innovation, Murata Manufacturing, Applied Materials, Shin Etsu Chemical, Showa Denko, Mitsubishi, CEA, Semiconductor Energy Laboratory, NEC.
  - Battery technologies included in the Excel file: Lithium battery, Ni-MH, Redox-flow, Li-Air, Li-S, Na-ion, Mg-ion.

- This useful patent database allows multi-criteria searches:
  - Patent publication number
  - Hyperlinks to the original documents
  - Priority date
  - Title
  - Abstract
  - Patent Assignees
  - Segmentation
  - Legal status for each member of the patent family

- Disclaimer: This report does not provide any insight analyses or counsel regarding legal aspects or the validity of any individual patent. Knowmade is a research firm that provides technical analysis and technical opinions. Knowmade is not a law firm. The research, technical analysis and/or work proposed or provided by Knowmade and contained herein is not a legal opinion and should not be construed as such.

MAIN PATENT ASSIGNEES MENTIONED IN THIS REPORT

INDUSTRIALS

3M, A123 Systems, AGC Seimi Chemical, Amogreentech, Amperex Technology, Asahi Glass, Automotive Energy Supply, Bak International, BASF, BMW, Boston Power, Brunp Recycling Technology, BYD, Chery Automobile, China FAW Automobile, Citic Dameng Holding, Daikin Industries, Denki Kogyo/Denka, Denso, Donguan Kaixin Battery Material, Du Pont De Nemours, Easpring Material Technology, Ecopro, Enerceramic, Envia, Fujifilm, General Motors, GS Yuasa, Hitachi Chemical, Hitachi Maxell, Hitachi Metals, Hitachi Vehicle Energy, Honda Motor, Huawei Technologies, Jinhe New Materials, Johnson Controls Technology, JX Nippon Mining Metals, Kokam, L&F, Leneng Battery, Leyden Energy, LG Chem, Li-Tec Battery, Medtronic, Mitsubishi Chemical, Mitsubishi Materials, Mitsui Mining & Smelting, Murata Manufacturing, Nano One Materials, Nec, Ningxia Orient Tantalum Industry, Nippon Chemical Industrial, Nippon Shokubai, Nissan Motor, Panasonic, Posco, PPG Industries, Renault, Reshine New Material, Robert Bosch, SAFT, Samsung Electronics, Samsung SDI, Sanyo Electric, Seeo, SEL, SK Innovation, Solvay, Sony, Sumitomo Chemical, Sumitomo Metal Mining, Tanaka Chemical, Techelios, Toda Kogyo, Toray Industries, Toshiba, Toyota Industries, Toyota Motor, Umicore, Wanxiang …

R&D LABORATORIES

CEA, Central South University, CNRS, Fujian Normal University, Harbin Institute of Technology, KETI, KERI, Osaka City University, RIST, UNIST, University of Chicago, University of Jiangnan, UT Battelle …

BENEFITS OF THE REPORT

Follow technology trends and anticipate the changes

- Identify key and new technological trends
- Detect emerging technologies
- Identify noticeable new patent publications, new granted or expired patents
- Speed your R&D and IP costs

Compare market and IP trends

- Dynamics
- Geographic coverage
- Companies
- Technologies

Follow technology trends and competitive environment from technology and patent perspective

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Keep a watch on your competitors

- Identify the major current IP players and new comers
- Track their IP activity, strategy and future intents
- Compare their IP and market position

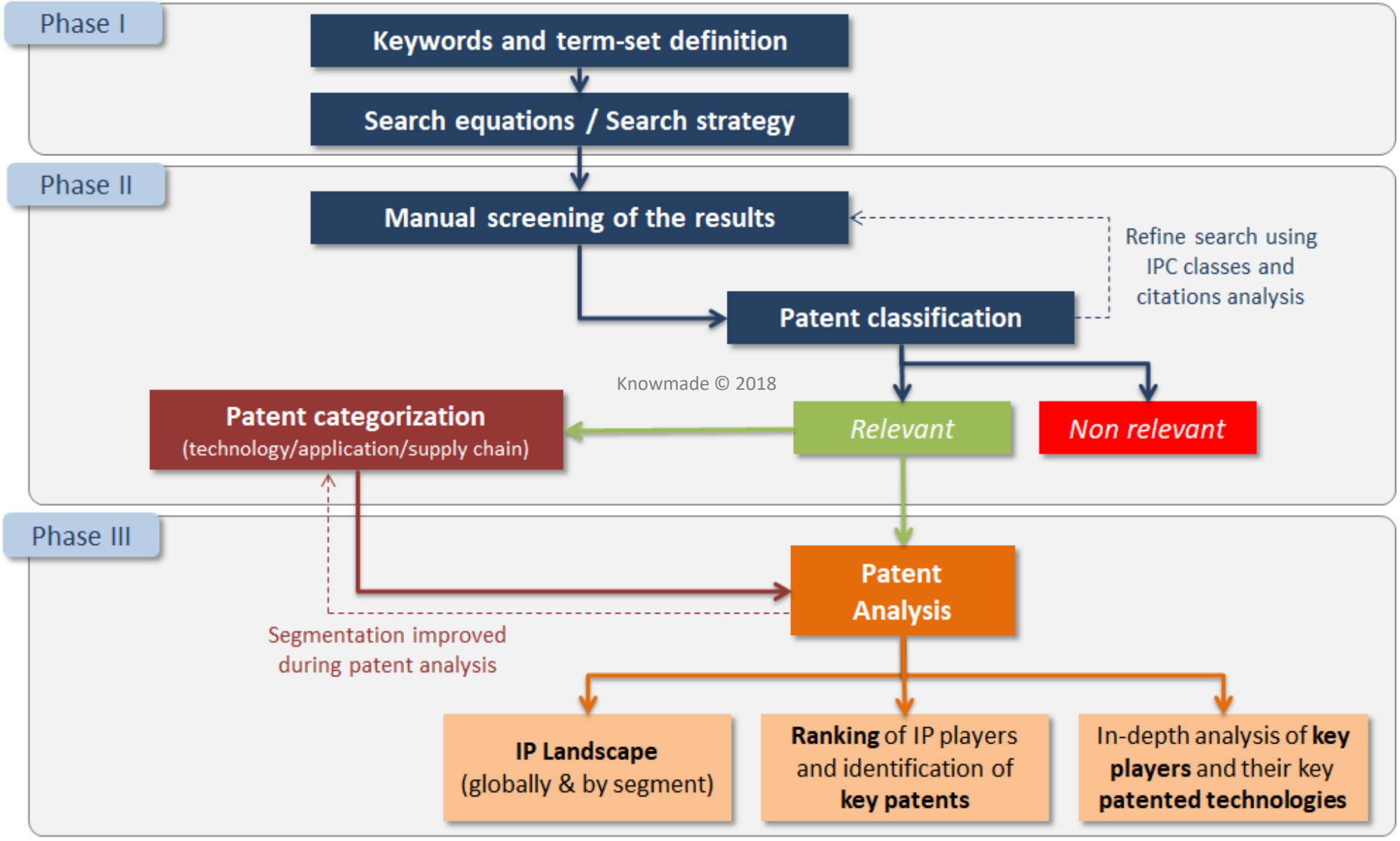
Detect business opportunities and mitigate the risk

- Discover new markets & technology directions
- Identify pure play companies
- Overview of current litigation

METHODOLOGY FOR PATENT SEARCH AND SELECTION

- The data were extracted from the **FamPat worldwide database** (Questel-ORBIT) which provides 100+ million patent documents from 95 offices.
- The search for patents was performed in **January 2018**. This report is focused on patents newly published, granted or expired/revoked in 2017
- The patents were grouped by **patent family**. A patent family is a set of patents filed in multiple countries to protect a single invention by a common inventor(s). A first application is made in one country – the priority country – and is then extended to other countries.
- The **selection** of the patents has been done both automatically and **manually**. The patents were **manually categorized in technical segments** using keyword analysis of patent title, abstract and claims, in conjunction with expert review of the subject-matter of inventions.
- Data analysis will be performed using the Questel Orbit IP Business Intelligence **analytics platform** combined with **Excel-based data processing**, and will be supplemented by **expert analysis**.
- For legal status of European (EP) and PCT (WO) patent applications, EPO Register Plus has been used. For legal status of US patents, USPTO PAIR has been used. For legal status of other patents, information have been gotten from their respective national registers.

METHODOLOGY FOR PATENT SEARCH AND SELECTION



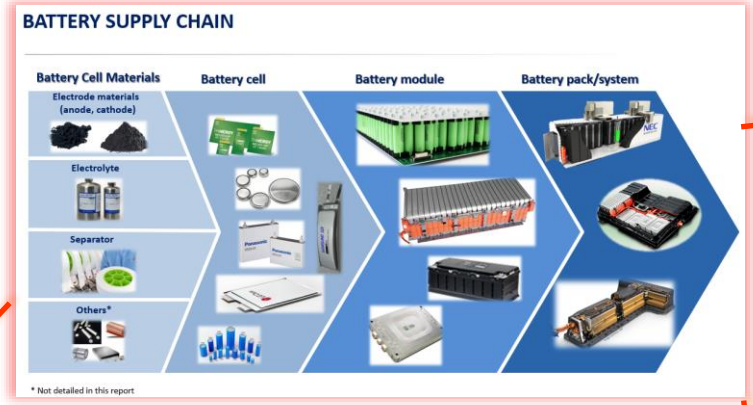
WORLDWIDE PATENTING ACTIVITY

REPORT SAMPLE

BATTERY SUPPLY CHAIN

Overview of Patenting Activity by Supply Chain segments

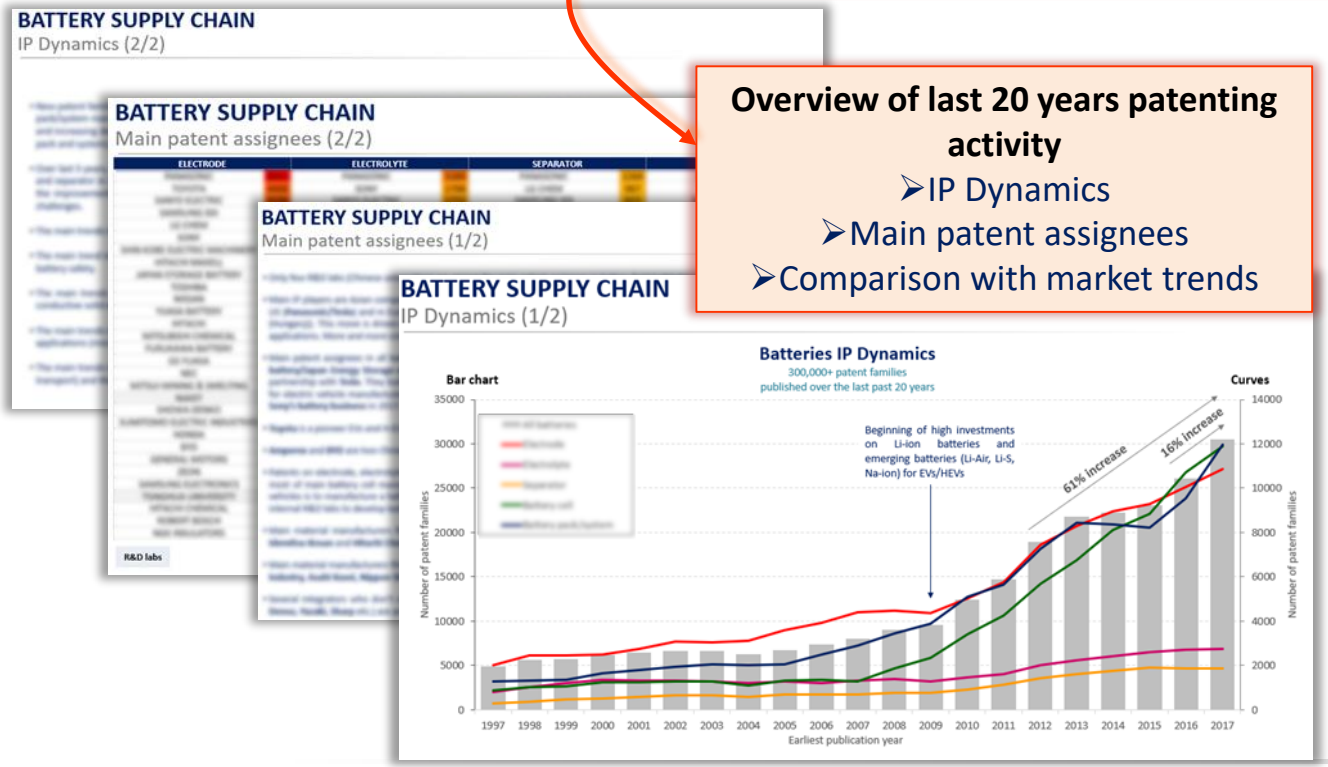
REPORT SAMPLE



Market vs IP players

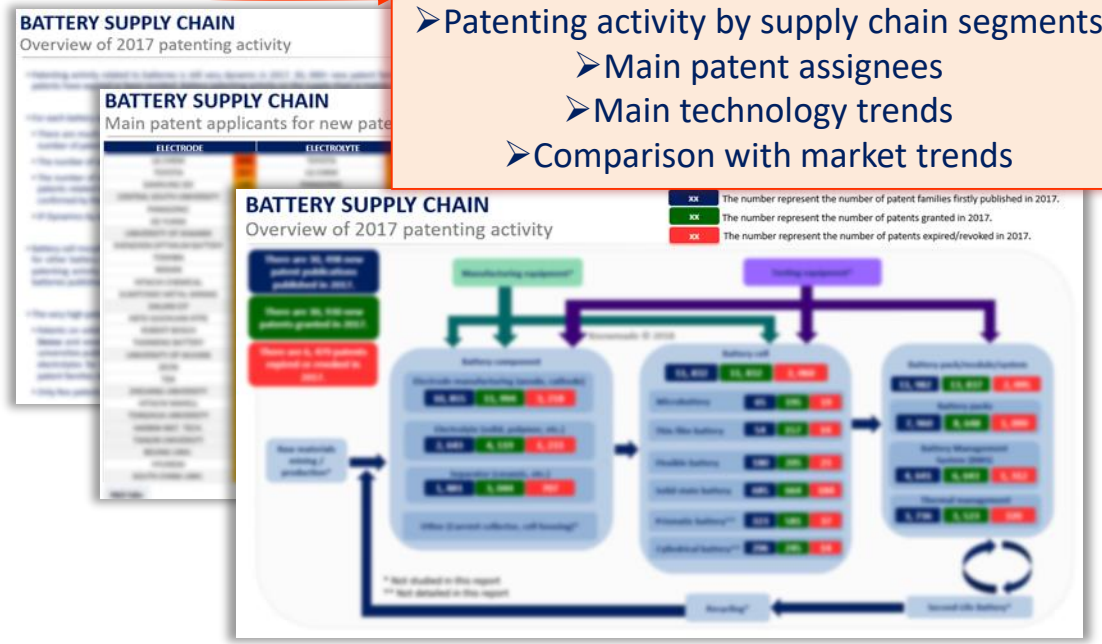
Overview of last 20 years patenting activity

- IP Dynamics
- Main patent assignees
- Comparison with market trends



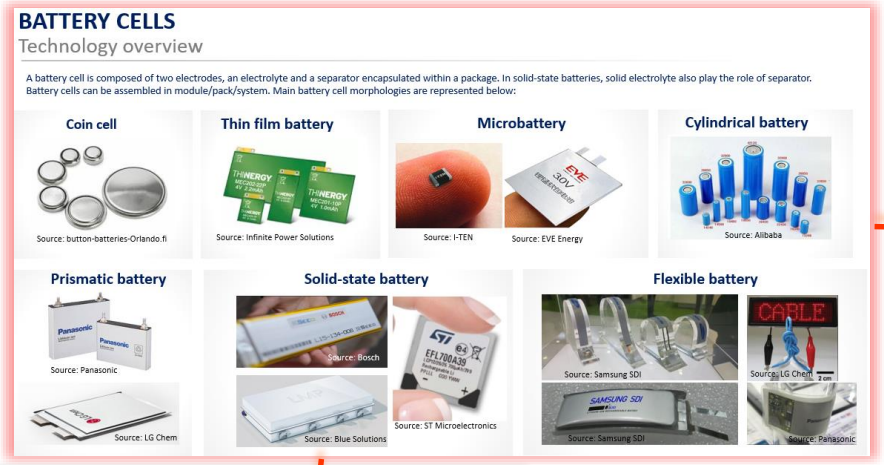
Overview of 2017 patenting activity

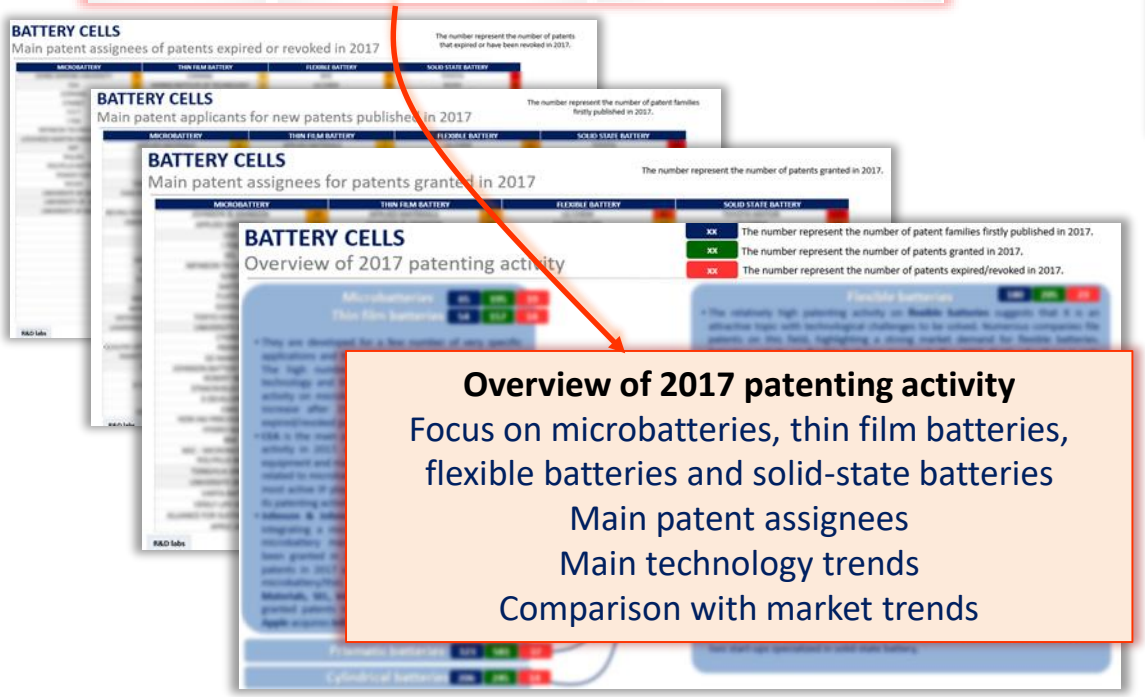
- Patenting activity by supply chain segments
- Main patent assignees
- Main technology trends
- Comparison with market trends



BATTERY CELLS

Overview of Patenting Activity by Supply Chain segments





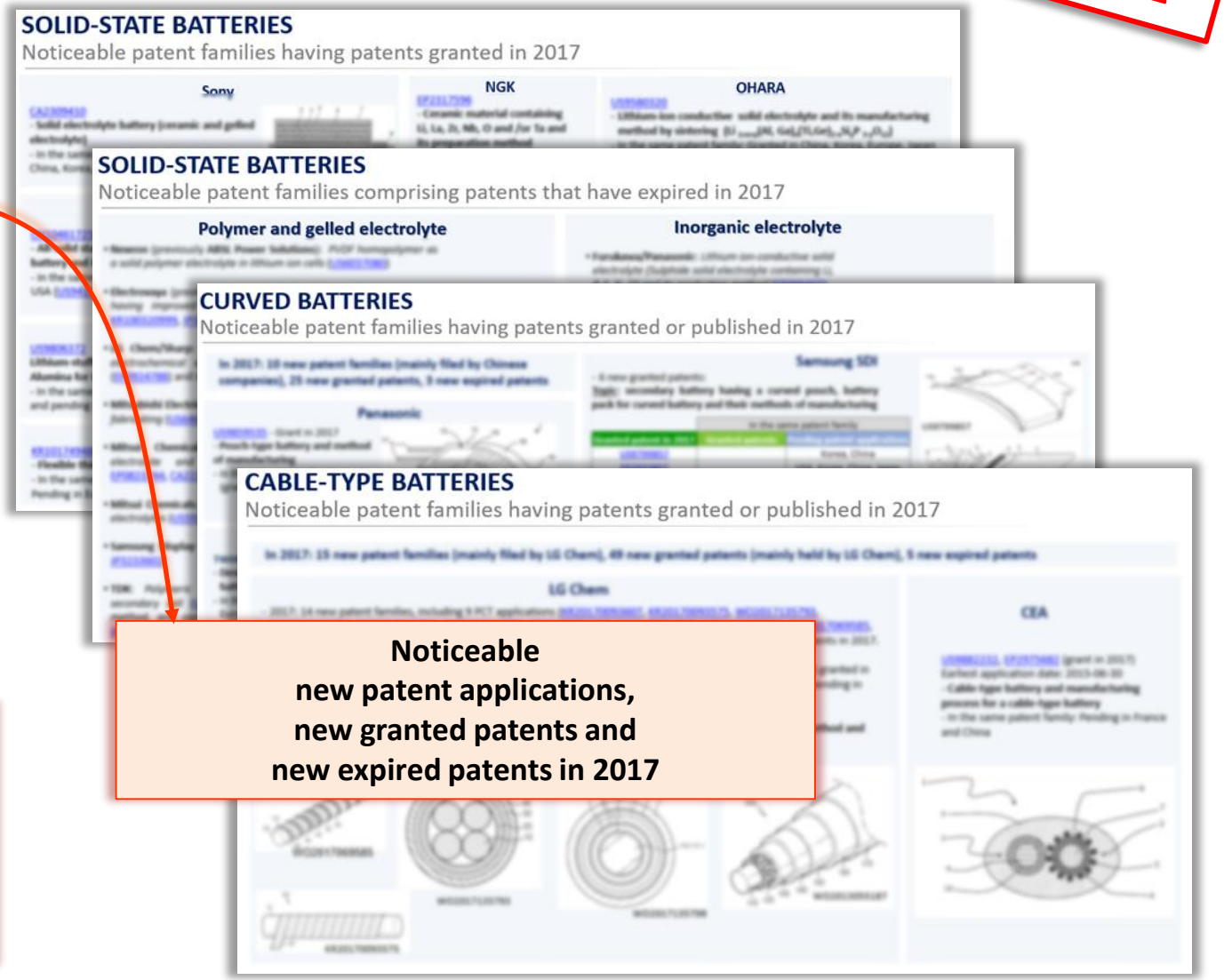
Overview of 2017 patenting activity

Focus on microbatteries, thin film batteries, flexible batteries and solid-state batteries

Main patent assignees

Main technology trends

Comparison with market trends



Noticeable
new patent applications,
new granted patents and
new expired patents in 2017

BATTERY PACK/SYSTEM

Overview of 2017 patenting activity

- Battery pack/system description
- Patenting activity (battery pack/systems, thermal management, BMS)
- Main patent assignees
- Main technology trends
- Comparison with market trends

FOCUS ON BATTERY PACK/SYSTEM

Main patent assignees of patents expired or revoked in 2017

The number represent the number of patents that expired or have been revoked in 2017.

BATTERY PACK/SYSTEM

Main patent assignees for patents granted in 2017

The number represent the number of patents granted in 2017.

BATTERY PACK/SYSTEM

Main patent applicants for new patents published in 2017

BATTERY PACK/SYSTEM

Overview of 2017 patenting activity

BATTERY PACK/SYSTEM

Technology overview

- **Battery module**: A group of cells connected together either in series and/or parallel configuration, encased in metal/plastic enclosure and with attached terminals.
- **Battery pack:** A battery which is ready for use, contained in a rigid enclosure with protective devices and thermal control system.
- **Battery system:** Battery system is different to battery pack. A battery system may include more than one battery pack, each including its own temperature management system, housing, protection devices ... It includes power system conversion (i.e. inverter, charger) and EMS to manage the energy flow between the application and the battery packs that supply energy for the application.
- **BMS:** Electronic system, associated with a battery pack, which monitors and /or manages in a safe manner its electric and thermal state by controlling its environment, and which provides communication between the battery system and other macro-system controllers.

- Several safety measures are set-up at the pack level to decrease risks related to Li-ion batteries (thermal, overcurrent, short-circuit, overvoltage, under voltage and overpressure protection, cell-state monitoring and control)

Components in a battery pack

Source: Yole développement, Beyond Li-ion batteries, 2016

BATTERY TECHNOLOGIES

Technology description

BATTERY TECHNOLOGIES
Main emerging technologies

Battery technology	Technological maturity	R&D efforts	Market adoption	Applications	First date of commercialization	Advantages	Drawbacks

BATTERY TECHNOLOGIES
Main commercialized technologies

Battery technology	Technological maturity	R&D efforts	Market adoption	Applications	First date of commercialization	Advantages	Drawbacks

Technology description

- Technology principle
- Advantages/Drawbacks
- Challenges and envisioned solutions
- Main market players
- Technology maturity
- R&D effort level
- Market adoption
- Market applications
- First date of commercialization

MAGNESIUM-ION BATTERY
Technology overview

SODIUM-ION BATTERY
Technology overview

LITHIUM-SULFUR BATTERY
Technology overview

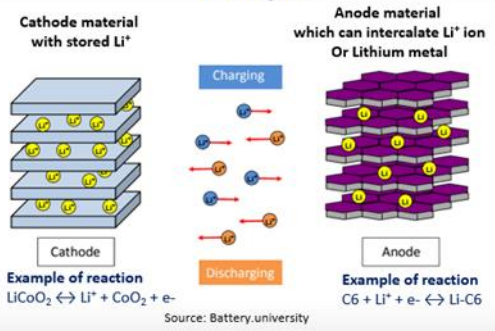
LITHIUM-AIR BATTERY
Technology overview

REDOX FLOW BATTERY
Technology overview

NI-MH BATTERY
Technology overview

LITHIUM-ION BATTERY
Technology overview

Principle



Source: Battery.university

Challenges and envisioned solutions

- **Improve performances** (energy density, power density (fast charging batteries), life duration especially for frequent and rapid charge/discharge and high temperature operation)
- **Improve safety**
- **Decrease costs**

Advantages

- High energy and power density
- High voltage
- Relatively long cycle life
- High efficiency,
- No memory effect
- Large operating temperature range
- Low self-discharge
- No heavy metals

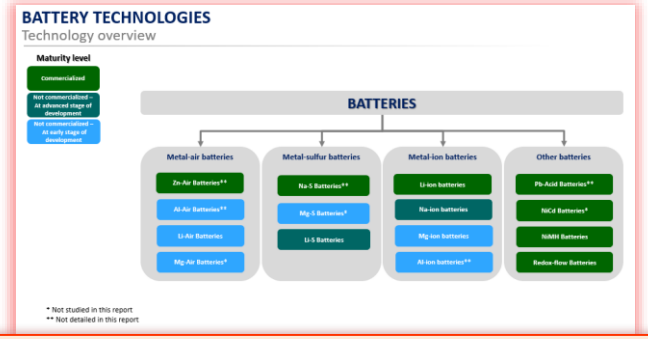
Drawbacks

- Safety (risk of fire or explosion if improperly handled, issues of thermal runaway) - BMS needed
- Low performances at extreme temperatures
- Not fast charging rates
- High costs

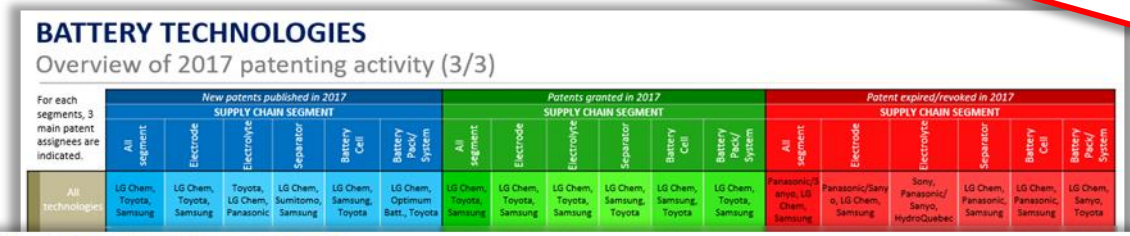
BATTERY TECHNOLOGIES

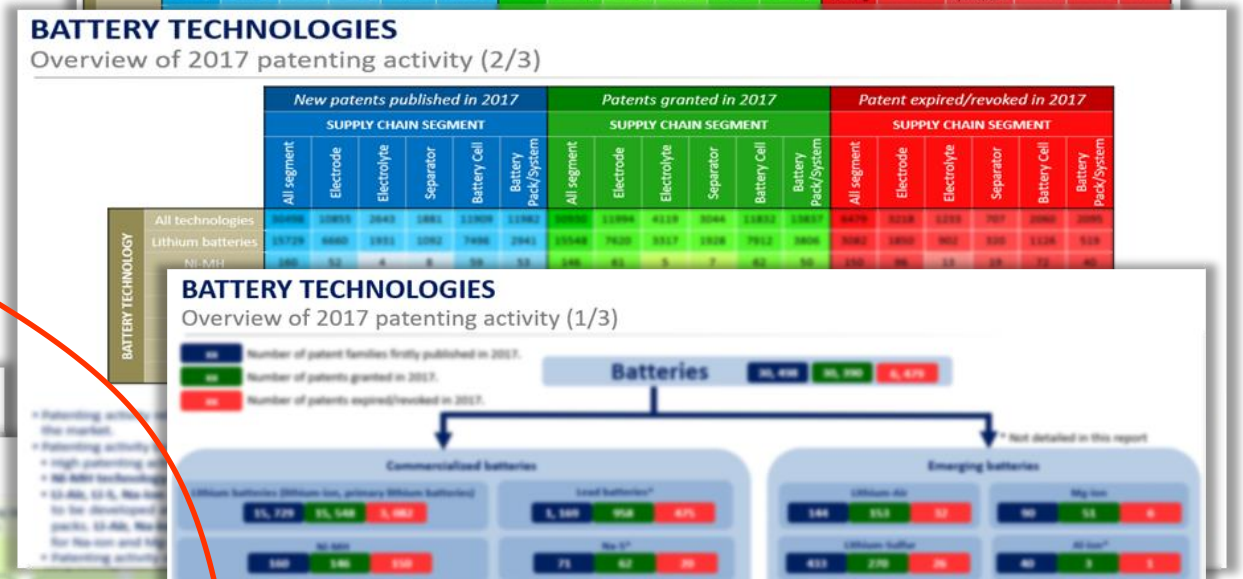
Overview of patenting activity by battery technologies

REPORT SAMPLE



Focus on Li-ion, Ni-MH, Redox-flow, Li-Air, Li-S, Na-ion, Mg-ion batteries





Overview of last 20 years patenting activity

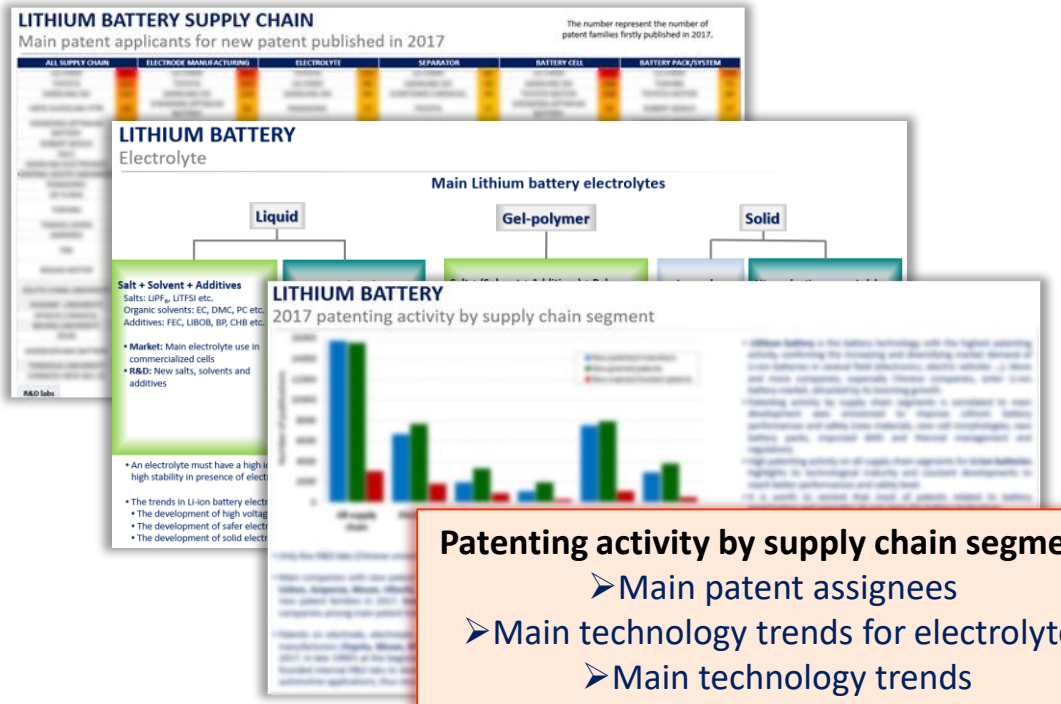
- IP Dynamics
- Main patent assignees
- Comparison with market trends
- Market vs IP players

Overview of 2017 patenting activity

- Patenting activity by battery technology and supply chain
- Main patent assignees
- Main technology trends
- Comparison with market trends

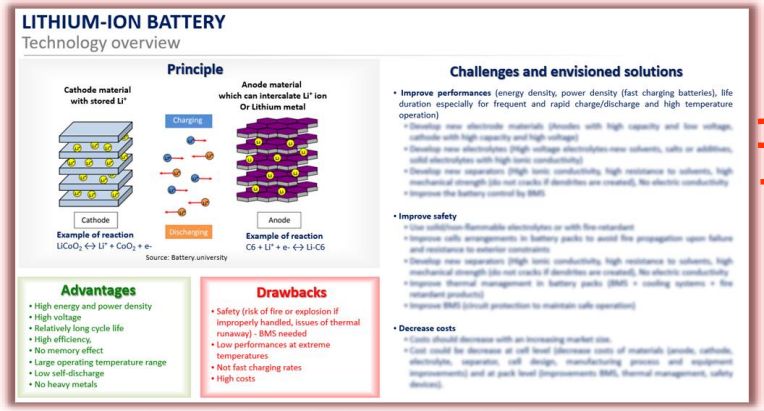
BATTERY TECHNOLOGIES

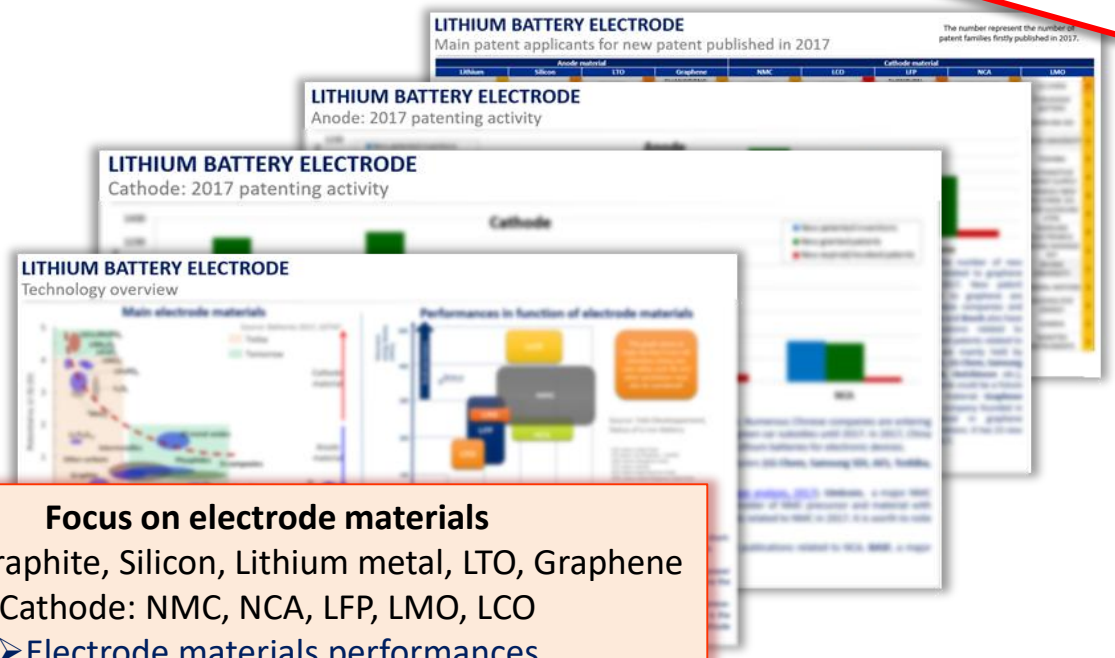
Focus on Lithium-ion battery



Patenting activity by supply chain segments

- Main patent assignees
- Main technology trends for electrolytes
- Main technology trends
- Comparison with market trends





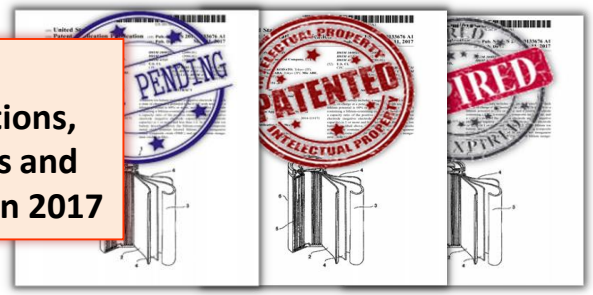
Focus on electrode materials

Anode: Graphite, Silicon, Lithium metal, LTO, Graphene

Cathode: NMC, NCA, LFP, LMO, LCO

- Electrode materials performances
- Main patent assignees
- Main technology trends
- Comparison with market trends

Noticeable new patent applications, new granted patents and new expired patents in 2017



BATTERY TECHNOLOGIES

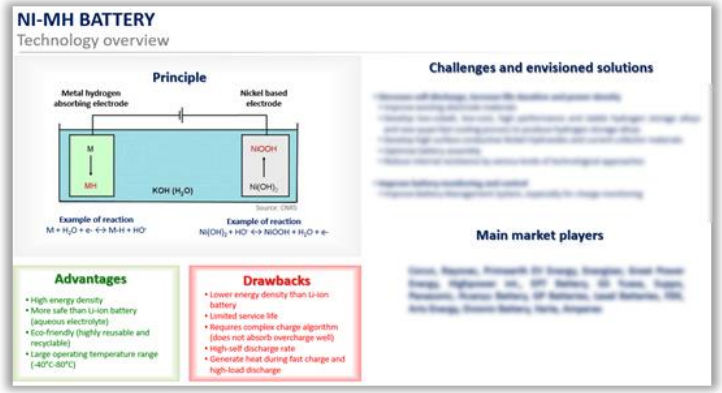
Focus on Ni-MH, Redox-flow, Li-Air, Li-S, Na-ion and Mg-ion Batteries

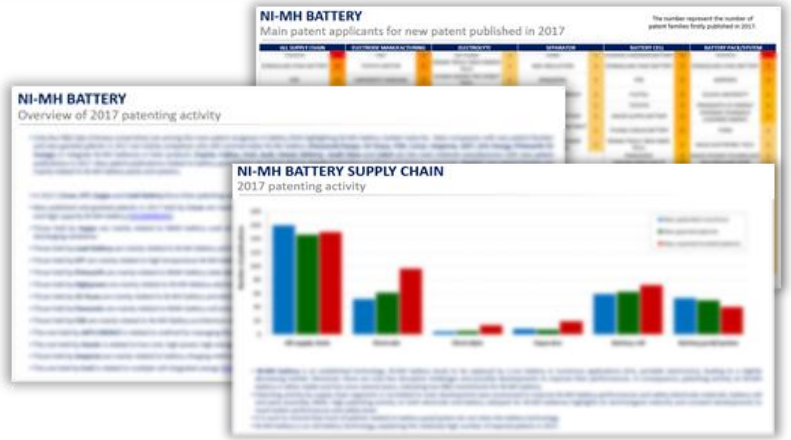
Ni-MH Battery
Redox-flow Battery
Li-Air Battery
Li-S Battery
Na-ion Battery
Mg-ion Battery

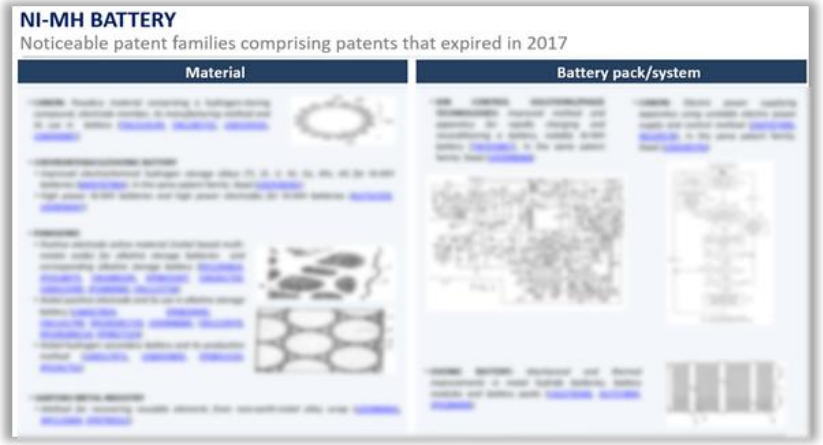
Technology description
- Principle, Advantages, drawbacks
- Main challenges,
- Main market players

Overview of 2017 patenting activity
- Number of patents by supply chain segments
- Main patent assignees
- Main technology trends
- Comparison with market trends

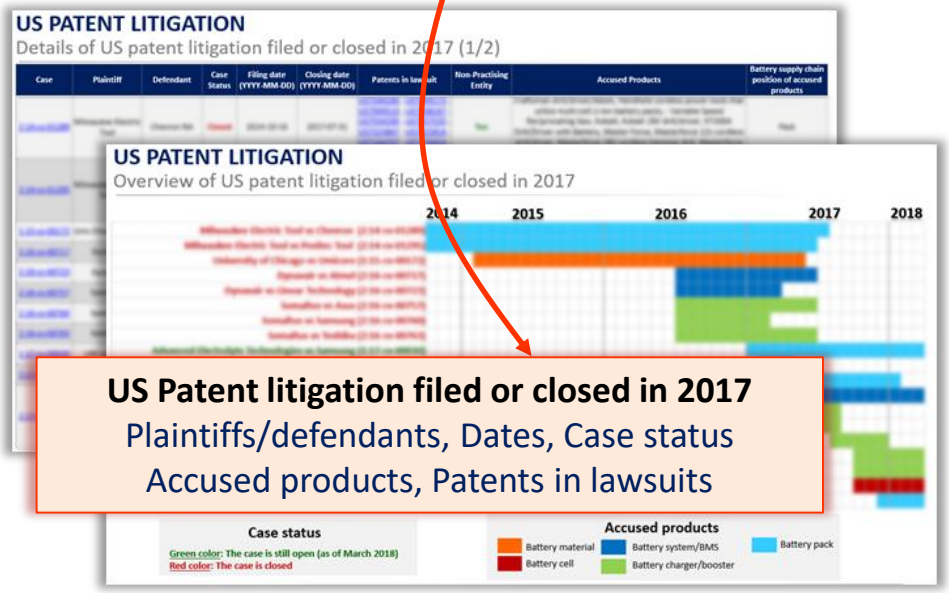
Noticeable
new patent applications,
new granted patents and
new expired patents in 2017



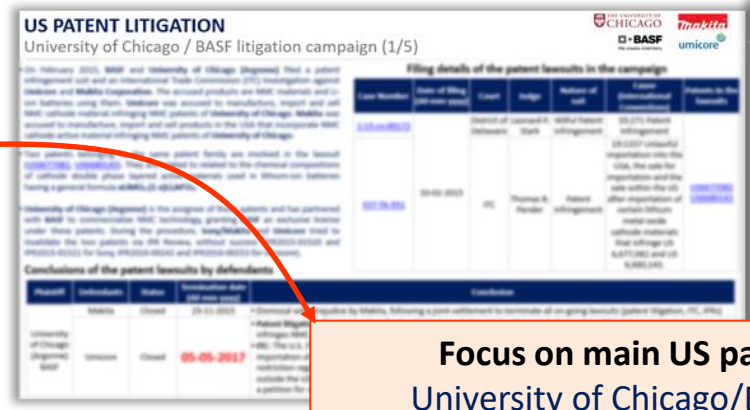


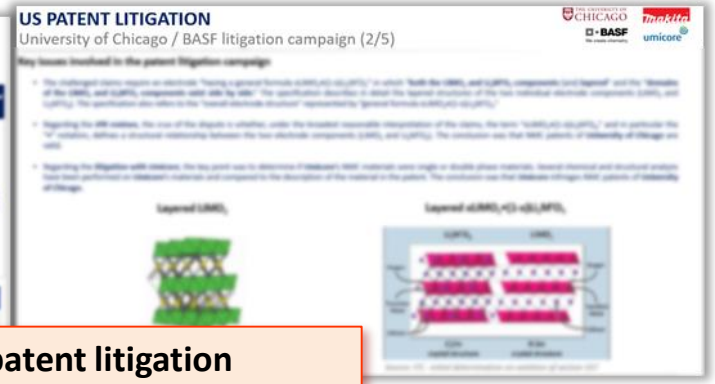


US PATENT LITIGATION

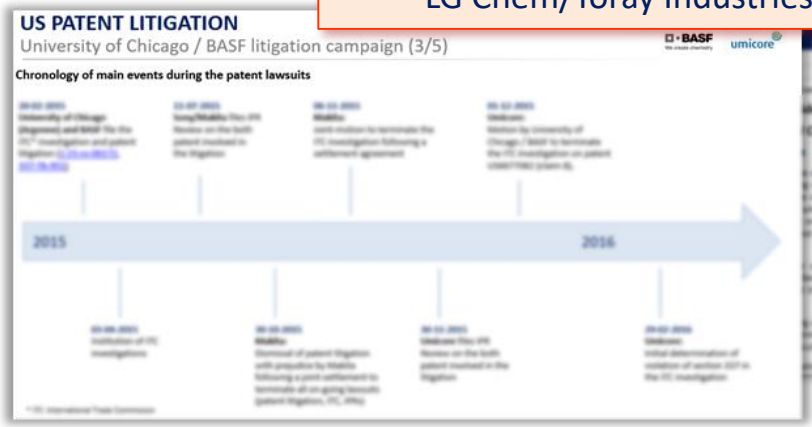


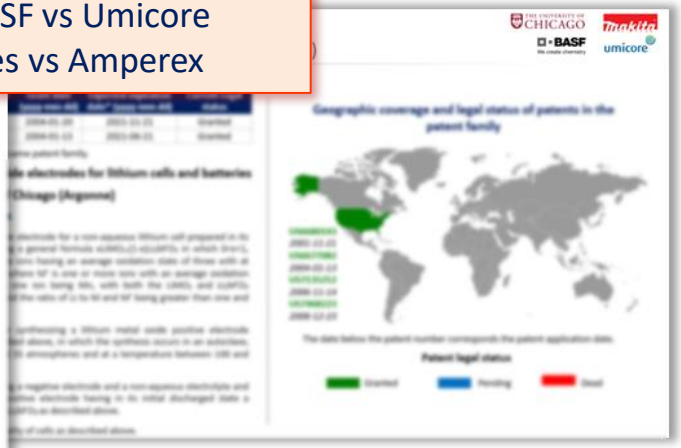
US Patent litigation filed or closed in 2017
Plaintiffs/defendants, Dates, Case status
Accused products, Patents in lawsuits





Focus on main US patent litigation
University of Chicago/BASF vs Umicore
LG Chem/Toray Industries vs Amperex



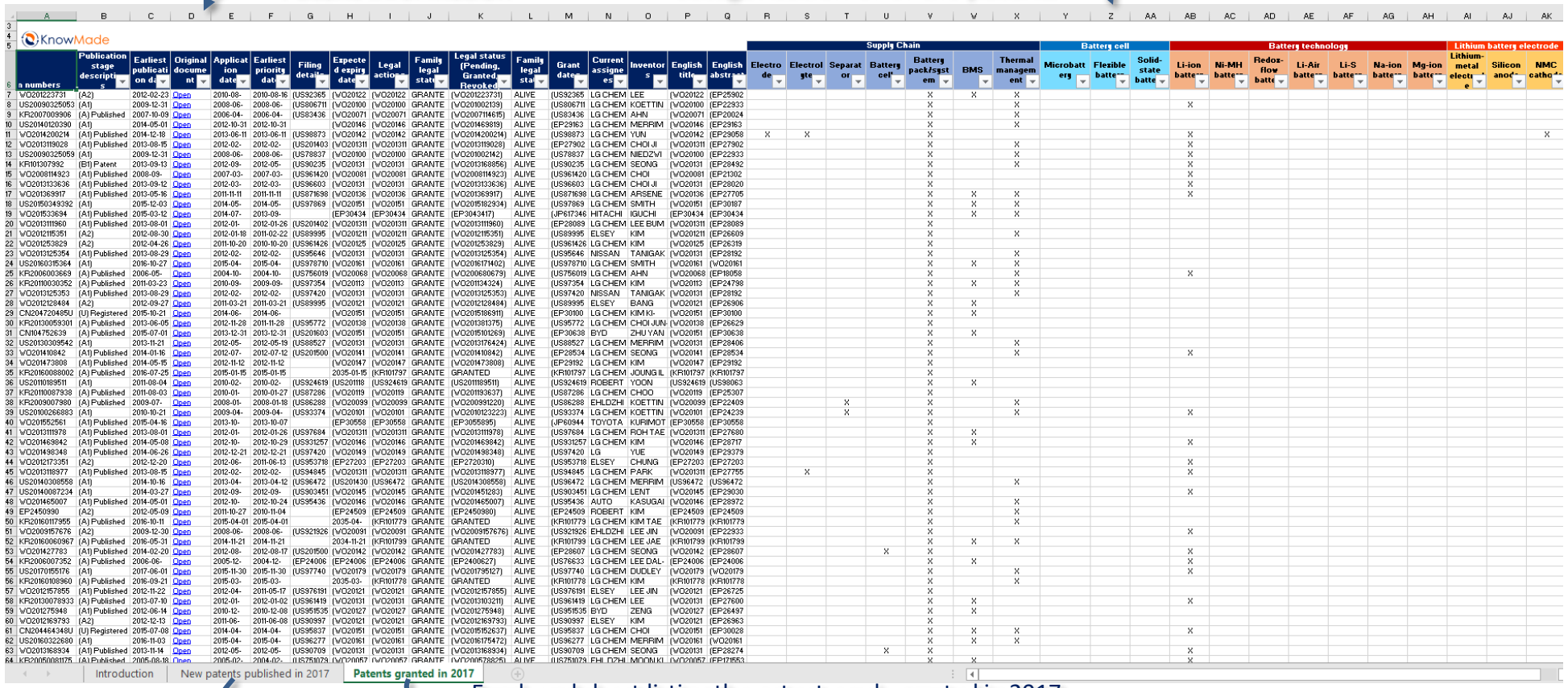


PATENT LIST

The report also includes an **Excel database** containing >40,900 patent families of the **main patent assignees** and related to **the key battery technologies**. This useful patent database allows **multi-criteria searches**, including patent numbers, priority/publication dates, patent assignees, titles, abstracts, claims, legal status of patents, hyperlinks to original documents, and **technical segmentation** (electrode, electrolyte, separator, battery cell, battery pack/system, Li-ion, Ni-MH, Redox flow, Lead, Li-Air, Li-S, Na-ion, Mg-ion, solid-state**)**.

Patent information

Categorization of of the patents



Excel worksheet listing the patent newly granted in 2017

Excel worksheet listing the new patent applications published in 2017

ORDER FORM

Status of the Battery Patents 2018

Ref.:KM18004

SHIP TO
Name (Mr/Ms/Dr/Pr):
_____
Job Title:
_____
Company:
_____
Address:
_____
City:
_____
State:
_____
Postcode/Zip:
_____
Country:
_____
VAT ID Number for EU members:
_____
Tel:
_____
Email:
_____
Date:
_____

PAYMENT METHODS

Check

To pay your invoice using a check, please mail your check to the following address**:**

KnowMade S.A.R.L.
2405 route des Dolines
06902 Valbonne Sophia Antipolis
FRANCE

Money Transfer

To pay your invoice using a bank money wire transfer please contact your bank to complete this process. Here is the information that you will need to submit the payment:

Payee: KnowMade S.A.R.L.
Bank: Banque Populaire Méditerranée, CAP 3000 Quartier du lac, 06700 St Laurent du Var
IBAN: FR76 1460 7003 6360 6214 5695 139
BIC/SWIFT: CCBPFRPPMAR

Paypal

In order to pay your invoice via PAYPAL, you must first register at www.paypal.com. Then you can send money to the KnowMade S.A.R.L. by entering our E-mail address contact@knowmade.fr as the recipient and entering the invoice amount.

RETURN ORDER BY

E-mail: contact@knowmade.fr
Mail: KnowMade S.A.R.L., 2405 route des Dolines, 06902 Valbonne Sophia Antipolis, FRANCE

PRODUCT ORDER

☐ **€6,490 – Corporate license**
☐ **€5,990 – Single user license***

For price in dollars, please use the day's exchange rate. For French customer, add 20% for VAT.

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I hereby accept Knowmade's Terms and Conditions of Sale
Signature:

Terms and Conditions of Sales

DEFINITIONS

"Acceptance": Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by signing the purchase order which mentions "I hereby accept Knowmade's Terms and Conditions of Sale".

"Buyer": Any business user (i.e. any person acting in the course of its business activities, for its business needs) entering into the following general conditions to the exclusion of consumers acting in their personal interests.

"Contracting Parties" or "Parties": The Seller on the one hand and the Buyer on the other hand.

"Intellectual Property Rights" ("IPR") means any rights held by the Seller in its Products, including any patents, trademarks, registered models, designs, copyrights, inventions, commercial secrets and know-how, technical information, company or trading names and any other intellectual property rights or similar in any part of the world, notwithstanding the fact that they have been registered or not and including any pending registration of one of the above mentioned rights.

"License": For the reports and databases, 2 different licenses are proposed. The buyer has to choose one license:

1. One user license: a single individual at the company can use the report.
2. Multi user license: the report can be used by unlimited users within the company. Subsidiaries are not included.

"Products": Reports are established in PowerPoint and delivered on a PDF format and the database may include Excel files.

"Seller": Based in Sophia Antipolis (France headquarters), Knowmade is a technology intelligence company specialized in the research and analysis of scientific and technical information. We provide patent landscapes and scientific state of the art with high added value to businesses and research laboratories. Our intelligence digests play a key role to define your innovation and development strategy.

1. SCOPE

1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. ANY ADDITIONAL, DIFFERENT, OR CONFLICTING TERMS AND CONDITIONS IN ANY OTHER DOCUMENTS ISSUED BY THE BUYER AT ANY TIME ARE HEREBY OBJECTED TO BY THE SELLER, SHALL BE WHOLLY INAPPLICABLE TO ANY SALE MADE HEREUNDER AND SHALL NOT BE BINDING IN ANY WAY ON THE SELLER.

1.2 This agreement becomes valid and enforceable between the Contracting Parties after clear and non-equivocal consent by any duly authorized person representing the Buyer. For these purposes, the Buyer accepts these conditions of sales when signing the purchase order which mentions "I hereby accept Knowmade's Terms and Conditions of Sale". This results in acceptance by the Buyer.

1.3 Orders are deemed to be accepted only upon written acceptance and confirmation by the Seller, within [7 days] from the date of order, to be sent either by email or to the Buyer's address. In the absence of any confirmation in writing, orders shall be deemed to have been accepted.

2. MAILING OF THE PRODUCTS

2.1 Products are sent by email to the Buyer:

- within [1] month from the order for Products already released; or
- within a reasonable time for Products ordered prior to their effective release. In this case, the Seller shall use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in progress.

2.2 Some weeks prior to the release date the Seller can propose a pre-release discount to the Buyer.

The Seller shall by no means be responsible for any delay in respect of article 2.2 above, and including in cases where a new event or access to new contradictory information would require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Products.

2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in article 3.

2.4 The mailing is operated through electronic means either by email via the sales department. If the Product's electronic delivery format is defective, the Seller undertakes to replace it at no charge to the Buyer provided that it is informed of the defective formatting within 90 days from the date of the original download or receipt of the Product.

2.5 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to produce sufficient evidence of such defects.

2.6 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without providing prior information to the Seller as required under article 2.5 shall remain at the Buyer's risk.

3. PRICE, INVOICING AND PAYMENT

3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to annual subscriptions. They are expressed to be inclusive of all taxes. The prices may be reevaluated from time to time. The effective price is deemed to be the one applicable at the time of the order.

3.2 Payments due by the Buyer shall be sent by cheque payable to Knowmade, PayPal or by electronic transfer to the following account:

Banque Populaire Méditerranée, CAP 3000 Quartier du lac, 06700 St Laurent du Var
BIC or SWIFT code: CCBPFRPPMAR
IBAN: : FR76 1460 7003 6360 6214 5695 139

To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this case, the need of down payments will be mentioned on the order.

3.3 Payment is due by the Buyer to the Seller within 30 days from invoice date, except in the case of a particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the «BCE» + 7 points, in accordance with article L. 441-6 of the French Commercial Code. Our publications (report, database, tool...) are delivered only after reception of the payment.

3.4 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice at the stage in progress, and to take legal action for damages.

4. LIABILITIES

4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the Products for its business activities, shall be solely responsible for choosing the Products and for the use and interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and acts it deduces thereof.

4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or arising from a material breach of this agreement

4.3 In no event shall the Seller be liable for:

a) damages of any kind, including without limitation, incidental or consequential damages (including, but not limited to, damages for loss of profits, business interruption and loss of programs or information) arising out of the use of or inability to use the Seller's website or the Products, or any information provided on the website, or in the Products;

b) any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations thereof.

4.4 All the information contained in the Products has been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.

4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification shall not lead to the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.

4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities or compensation of any kind for labor costs, delays, loss caused or any other reason. The replacement is guaranteed for a maximum of two months starting from the delivery date. Any replacement is excluded for any event as set out in article 5 below.

4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages or cancellation of the orders, except for non-acceptable delays exceeding [4] months from the stated deadline, without information from the Seller. In such case only, the Buyer shall be entitled to ask for a reimbursement of its first down payment to the exclusion of any further damages.

4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of saleability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

5. FORCE MAJEURE

The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not the fault of the Seller.

6. PROTECTION OF THE SELLER'S IPR

6.1 All the IPR attached to the Products are and remain the property of the Seller and are protected under French and international copyright law and conventions.

6.2 The Buyer agreed not to disclose, copy, reproduce, redistribute, resell or publish the Product, or any part of it to any other party other than employees of its company. The Buyer shall have the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:

- Information storage and retrieval systems;
- Recordings and re-transmittals over any network (including any local area network);
- use in any timesharing, service bureau, bulletin board or similar arrangement or public display;
- Posting any Product to any other online service (including bulletin boards or the Internet);
- Licensing, leasing, selling, offering for sale or assigning the Product.

6.3 The Buyer shall be solely responsible towards the Seller of all infringements of this obligation, whether this infringement comes from its employees or any person to whom the Buyer has sent the Products and shall personally take care of any related proceedings, and the Buyer shall bear related financial consequences in their entirety.

6.4 The Buyer shall define within its company point of contact for the needs of the contract. This person will be the recipient of each new report in PDF format. This person shall also be responsible for respect of the copyrights and will guaranty that the Products are not disseminated out of the company.

7. TERMINATION

7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification by the Buyer of such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.

7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may send a notification to the other by recorded delivery letter upon which, after a period of thirty (30) days without solving the problem, the non-breaching Party shall be entitled to terminate all the pending orders, without being liable for any compensation.

8. MISCELLANEOUS

All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its licensors, employees and agents. Each of them is entitled to assert and enforce those provisions against the Buyer.

Any notices under these Terms and Conditions shall be given in writing. They shall be effective upon receipt by the other Party.

The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated to him in due time.

9. GOVERNING LAW AND JURISDICTION

9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Grasse, which shall have exclusive jurisdiction upon such issues.

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions.

FOR GOING EVEN FURTHER

PATENT WATCH SERVICE

KnowMade
Patent & Technology Intelligence

FOR GOING EVEN FURTHER

Patent Watch Service (1/2)

Get updated data on battery patent activity

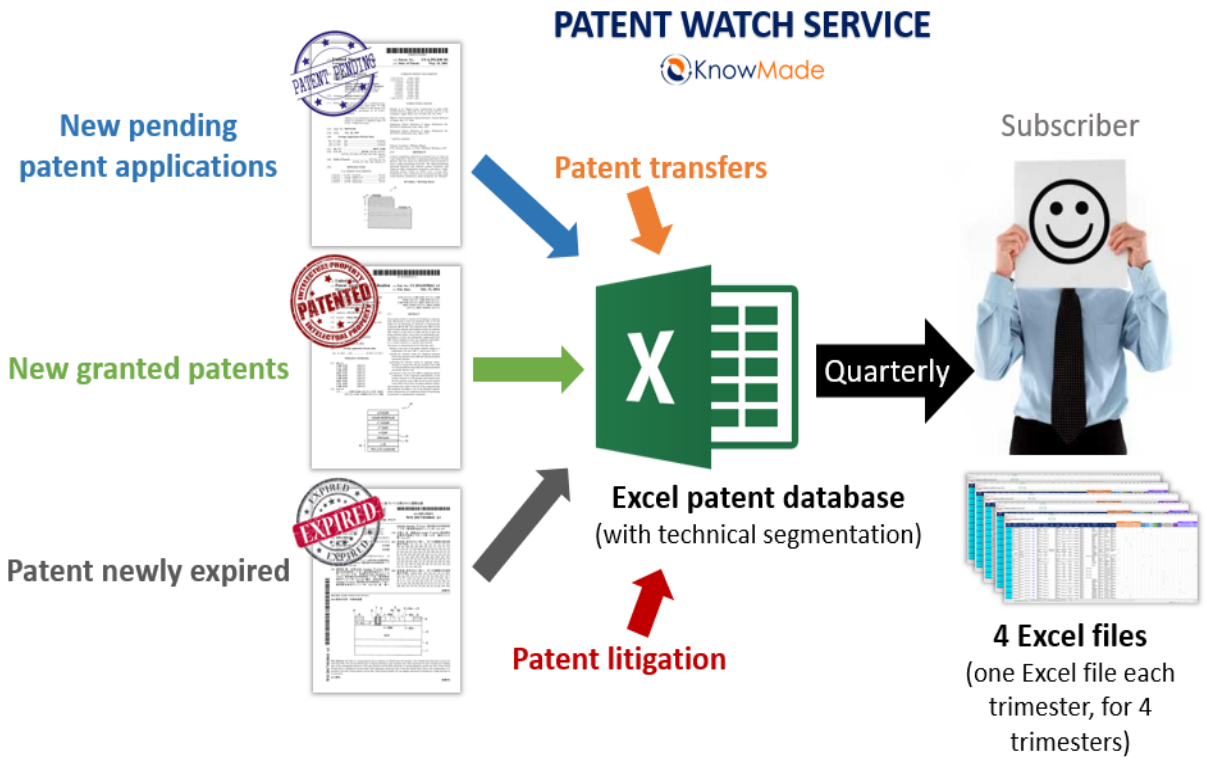
Keep a watch on your competitors' IP activities and their future intentions.
With the help of the patent watch service, you will be aware of your competitors' current patenting activities, their IP dynamics, patent transfers including acquisitions and licenses, patent litigation, technology development and R&D strategies. You will also be able to rapidly detect new entrants in your business area .

Keep track of the latest technology developments and follow technology trends.
By keeping note of any recent patent filings, you can track the newest innovations in the battery field. You will get details on claimed inventions and you can follow technology developments. New technical solutions could inspire and improve your R&D activity.

Prevent registration of IP rights that may be harmful to your business.
You will obtain information on patent applications filed even before exclusive rights have been granted and you can react in time to prevent registration of IP rights that may be harmful to your business.

React in time to infringements and mitigate legal risks.
Monitoring both newly-issued patents and patent litigation allows you to regularly assess your freedom-to-operate, ensuring your products or processes are not covered by granted patents and thus they can be manufactured, sold or used safely without infringing valid IP rights owned by others.

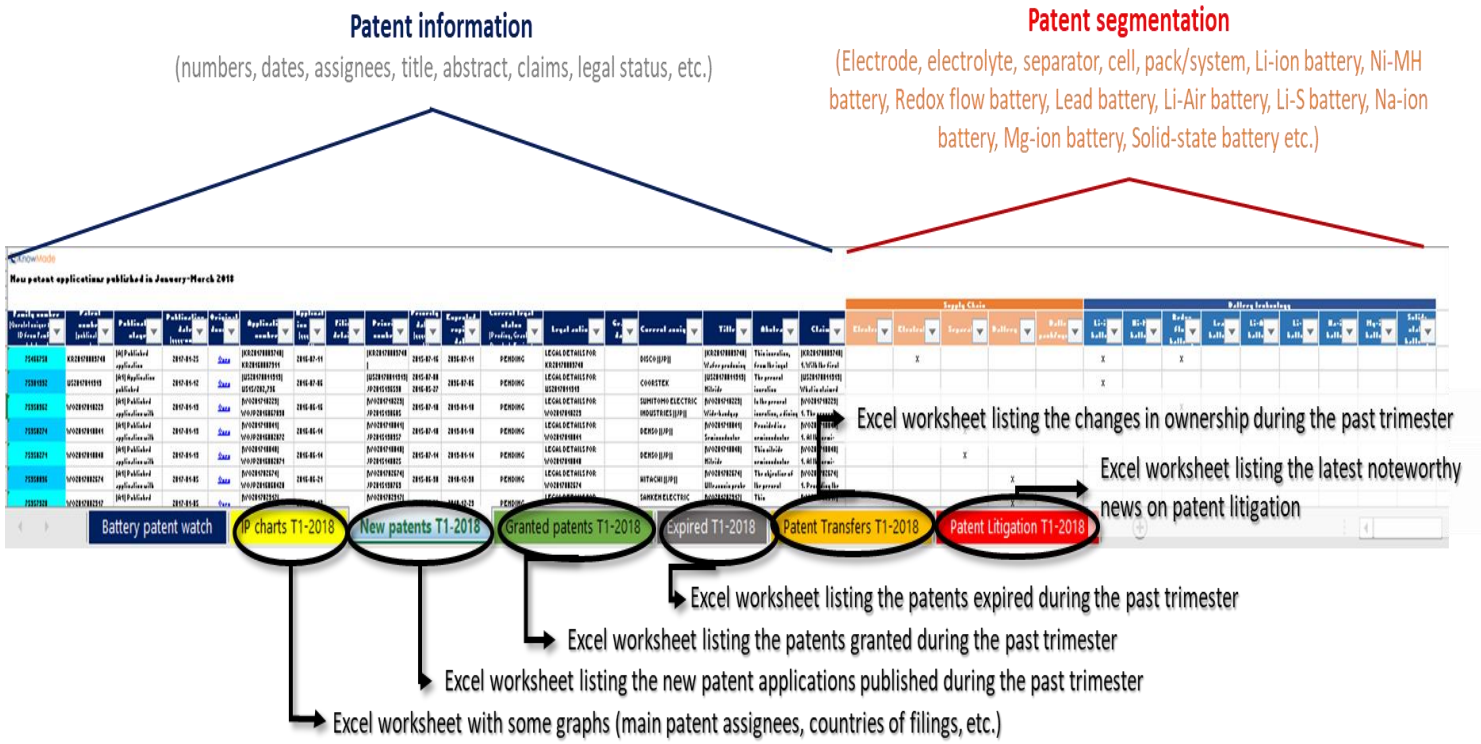
Take advantage of free technologies and decrease R&D project risks.
By tracking both expired patents and abandoned patents, you will be able to identify inventions entering the public domain that you can use safely for your development.



FOR GOING EVEN FURTHER

Patent Watch Service (2/2)

- With the **booming number of companies** involved in battery IP and the **proliferation of battery technologies**, take advantage of **quarterly updated Excel file** including the patents newly **published, granted** or **expired** during the past **3 months**, plus the latest **patent transfers** and noteworthy news on **patent litigation**.
- The patents will be **categorized** by supply chain segments (**electrode, electrolyte, separator, battery cell, battery pack/system**) and battery technologies (**Li-ion, Ni-MH, Redox flow, Lead, Li-Air, Li-S, Na-ion, Mg-ion, solid-state**, **thin film/flexible, lithium metal electrode, NMC cathode for Lithium battery, Silicon anode for Lithium battery**). This useful patent database allows for **multi-criteria searches** (patent numbers, priority dates, patent assignees, titles, abstracts, claims, legal status of patents, hyperlinks to original documents). This quarterly updated Excel file also includes graphs highlighting the **main IP trends of the past 3 months** for each technical segment (patent applicants, countries of patent filings, IP dynamics, etc.).



CONTACT THE AUTHORS

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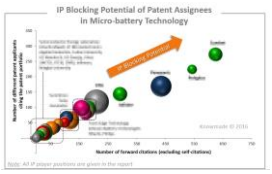
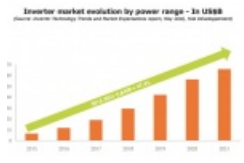


- Microbattery Patent Landscape (September 2016) (link)
- NMC Lithium-ion Battery Patent Landscape (July 2017) (link)
- Wireless Charging Patent Landscape (November 2017) (Link)

You may also be interested in those market analysis reports of our partner Yole Développement:



- Li-ion Battery Packs for Automotive and Stationary Storage Applications (Link)
- Status of Rechargeable Li-ion Battery Industry (July 2017) (link)
- Stationary Storage and Automotive Li-ion Battery Packs (May 2016) (link)