THE BATTERY SHOW
NORTH AMERICA

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Battery Trade Secret War Stories and Battery Patent Filing Trends

John Platt, Snell & Wilmer

We Understand Batteries

- **Full-service law firm – 480 attorneys**
- Our clients include battery innovators and battery integrators (e.g., auto manufacturers)
- **40+ IP attorneys**
- Battery materials, cells, modules, thermal systems, battery management systems

Types of IP

- Patents protect inventions (devices, systems and processes)
- Trademarks protect business/product names, brands, and logos (identifying the source of goods/services)
- Copyrights
  - Protect expression (not ideas) from being copied
- Trade Secrets
  - Protect business processes (if kept confidential)

Trade Secret

- "Trade secret" means information, including a formula, pattern, compilation, program, device, method, technique, or process, that:
    - (i) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and
    - (ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

Trade Secret – Key Points

- Not generally known
- Not readily ascertainable by proper means
- Gives competitive advantage over those who do not know it
- Reasonable efforts to keep it secret

Trade Secret - Damages

- Total damages in U.S. trade secret cases vary greatly year to year:
  - 2011 - $1.21 Billion
  - 2013 - $12 Million
  - 2020 - $591.2 Million

Trade Secret – or – Patent?

- Advantages of protecting IP with trade secret:
- Trade secrets do not have to be new/non-obvious
  - Can be a combination of items that individually are publicly known
  - Can include information that is not eligible for a patent and could never be patented
- You don't have to request a Trade Secret from a Government Agency
- You have to disclose your patent
- Trade secrets can evolve, patent applications are set at the time of filing
- Trade secrets can potentially last forever, patents only 20 years
- One can design around a patent, but trade secret protection extends to modifications or improvements derived from the other party's secret

Trade Secret - Disadvantages

- It is perfectly OK for a third-party to come up with your secret if they do so on their own
- A competitor can invent on their own or reverse engineer your product
- Once the secret is out-of-the bag, you've lost protection
  - e.g. accidental disclosure

Trade Secret – Example Theft Scenarios

1. Academic collaborations
2. Research Partnerships
3. Mergers and Acquisitions
4. Joint Ventures
5. Departing founders and employees, former franchise owners
6. Publications (by your own people, or Academics you work with)
7. Cyber Threats
8. Physical break-in

Typical Scenario

- Allegation by Plaintiff:
- It spent years developing technology, 1000's of tests, 100's of engineers, six generations of product.
- Competitor starts last year, hires a bunch of Plaintiff's employees, goes public, and releases its own similar product in 1/10th the time with a few dozen engineers.

Typical Scenario - Continued

Plaintiff hires a forensic auditor:

- One engineer downloaded thousands of files near midnight, shortly before he announced his resignation from Plaintiff and departed to Defendant
- Another engineer downloaded numerous files and wiped his tracks afterwards
- Stored on USB
- Trade secrets / confidential information: test data, designs, component designs, system designs, manufacturing (facilities, tooling, processes, and test equipment)

Plaintiff demands its information back, but the employees claim ignorance or suggest that the requested information has been destroyed

Defendant denies wrong-doing

Establishing the Trade Secret Case:

1. Identify the trade secret
2. Establish that the trade secret was stollen
3. Establish that you have taken reasonable measure to protect the trade secret
4. Establish that the trade secrets derive independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable through proper means by, another person who can obtain economic value from the disclosure or use of the information
5. If possible, establish that the misappropriation was intentional, knowing, willful, malicious, fraudulent and oppressive
6. Ask for an injunction
7. Ask for damages (establish the value of the harm)

Efforts to Maintain Secrecy

Plaintiff will allege that has in place:

Physical security measures

- Badges
- Visitors sign NDA and wear badge
- Access to sensitive locations within its facilities controlled by employee badges
- Logs for after-hours access
- Closed circuit cameras monitoring facilities

Efforts to Maintain Secrecy

Document marking

- Employees instructed to use document templates stamped with “proprietary” or “Confidential and Proprietary” when preparing reports and other documents that contain sensitive or proprietary IP

Electronic security measures

- Firewalls, VPN, password strength requirements
- Document management systems
- Password access
- Update of security software every 3-6 months
- Maintain log of network access and downloads
- Encryption of hard drives on company laptops, backups

Efforts to Maintain Secrecy

Legal security measures

- Employee Invention Assignment and Confidentiality Agreement
- Employees sign agreement to abide by handbook (nondisclosure / confidentiality)
- Employees attend a security training re how to maintain confidentiality
- Employee exit interview (return badges, keys, notebooks, laptops, etc.)

Celgard v Shenzhen “Senior” Technology (UK - 2020)

- Celgard and Senior are both major players in the battery separator market, both investing heavily in R&D
- Dr Steven Zhang resigned from Celgard telling the CEO that he was going to General Electric
- Instead, he commenced work for Senior under a false name (Bin Wang)
- When Celgard learned that Dr Zhang worked for Senior he claimed he was not working on battery separators,
- but photographs of Dr Zhang made it clear that this wasn’t true

- Celgard sought an interim injunction to prevent Senior from selling new products in the UK alleging misappropriation of trade secret information by Dr Zhang
    - Alleged that the information allowed Senior to manufacture less expensively, allowing Senior to undercut Celgard in the UK market resulting in the loss of a contract with the UK division of a major batteries manufacturer

Celgard v Shenzhen “Senior” Technology (UK - 2020)

- Senior tactically delayed trial proceedings until after their first shipment under the UK contract had been made, hiding the pending shipment from the court
    - This resulted in the injunction being granted too late to prevent the shipment from arriving in the UK

The Judge granted an interim injunction.

- Essentially said that there may not be enough solid evidence of what the trade secret was, what was stolen, and its value. But the Senior and Dr. Zhao behaviour was so bad that an injunction was warranted.

Celgard v Shenzhen "Senior" Technology (UK - 2020)

"there will always be difficult questions around how much of what Dr Zhang took with him was a trade secret and how much was part of his own general expertise and acquired knowledge, not capable of being protected by Celgard as confidential information"

- This reinforces the importance of clear identification of trade secrets, and of managing staff transitions

Company Z vs. SK Innovation

- Z lost a bid for VW eV battery pack orders, and Z accuses SK of stealing trade secrets related to eV battery technology
- April 2019 - Z files trade secret suit (Federal District Court and the International Trade commission (ITC)) alleging Z lost $1 billion due to SK's "multi-company, international conspiracy" to poach over 70 of its employees and steal trade secrets behind its electric vehicle batteries
- Sept 2019 – SK files battery patent infringement suit with ITC against Z
- Oct 2019 – ITC issues order to make SK produce documents relevant to the case
- Feb 2021 - The ITC Judge said that SK Innovation's evidence destruction was so thorough that he couldn't decide the case on the merits, so he gives a rare default judgment

Z vs. SK Innovation

Exclusion order – The ITC banned importation of SK's electric vehicle batteries for 10 years

- prohibiting "the entry of certain lithium-ion batteries, battery cells, battery modules, battery packs and components thereof" for the next decade
- But he allowed import of components for domestic production of the batteries for certain Ford Motor Co. and Volkswagen of America Inc vehicles, for 4 and 2 years and for replacing batteries for Kia vehicles that have already been sold in the US - basically a transition period

Apr 2021 – ITC provides a preliminary ruling in favor of SK in the patent suit

Z vs. SK Innovation

- Ford wants them to settle
- VW wants them to settle
- At stake: a $2B SK battery plant in Georgia
- Georgia's two new Democrat Senators and Republican Governor wants them to settle
- President Biden wants them to settle – could nix the ITC exclusion order
- Apr 2021 – Z and SK reach a settlement, two days before the presidential review deadline
- SK pays Z $1.8 Billion (two payments over 2 years and 6 years royalties). No more suits for 10 years

Statoil ASA v University of Southampton (UK)

- Misappropriation of background IP intended by Statoil to be kept as a trade secret
- Information was disclosed in confidence to Southampton by scientists at Statoil for the purpose of improving the use of some equipment
- The University filed a patent application based upon this information naming their academics as the inventors
- Both parties felt that they had ownership rights in the invention
- Statoil disputed this with an entitlement claim
- Southampton were held to have misappropriated Statoil's trade secret
- Costs in excess of £600,000 were awarded (and Statoil got the patent)

LiiON, LLC v. Company B

-
- LiiON (Chicago based) makes an uninterruptible power solution marketed to data centers
- LiiON entered an NDA/JV with Company A (partially spun off to Company B) and disclosed technology and confidential information to them
- Company B later cancelled purchase orders and announced expansion of its own UPS product line, which LiiON alleged included trade secrets
- LiiON argued that B improperly shared its trade secrets by selling them to Samsung, and that Samsung started making similar lithium-ion battery cabinets similar to LiiON's after Samsung started working with Company B
- Oct 26, 2021 – Chicago Federal judge throws out part of LiiON's trade secret case against Company B (UK based). Not enough evidence to support its misappropriation claims

Anthony Levandowski

- Levandowski was a founding member of company X's engineering team working on its self-driving car project from 2009 until he resigned in 2016
- Jan 27, 2016, Levandowski quits Company X to form his own company Ottomotto
- Aug 18, 2016, Uber buys Ottomotto, $680 million
- Oct 29, 2016, Company X serves Levandowski with arbitration demands. X alleges breach of his fiduciary duty and employment agreements, and violating nonsolicitation obligations, among other claims
- Nov 3, 2016, Levandowski notifies Uber of X's claims under his indemnification agreement

Anthony Levandowski

- Feb 23, 2017, X sues Uber for stealing trade secrets and infringing patents. Alleges Levandowski took thousands of files with him when he quit
- May 2017 U.S. District Judge asks federal prosecutors to investigate accusations that Uber stole X's self-driving car technology. Days later, Uber confirms it has fired Levandowski
- Feb 9, 2018 Uber and X settle, in the middle of their trade secrets trial. Uber gives X a portion of its equity (worth $245 million)
- Aug 27, 2019 California federal prosecutors announce a grand jury indictment charging Levandowski with dozens of counts of theft and attempted theft of trade secrets

Anthony Levandowski

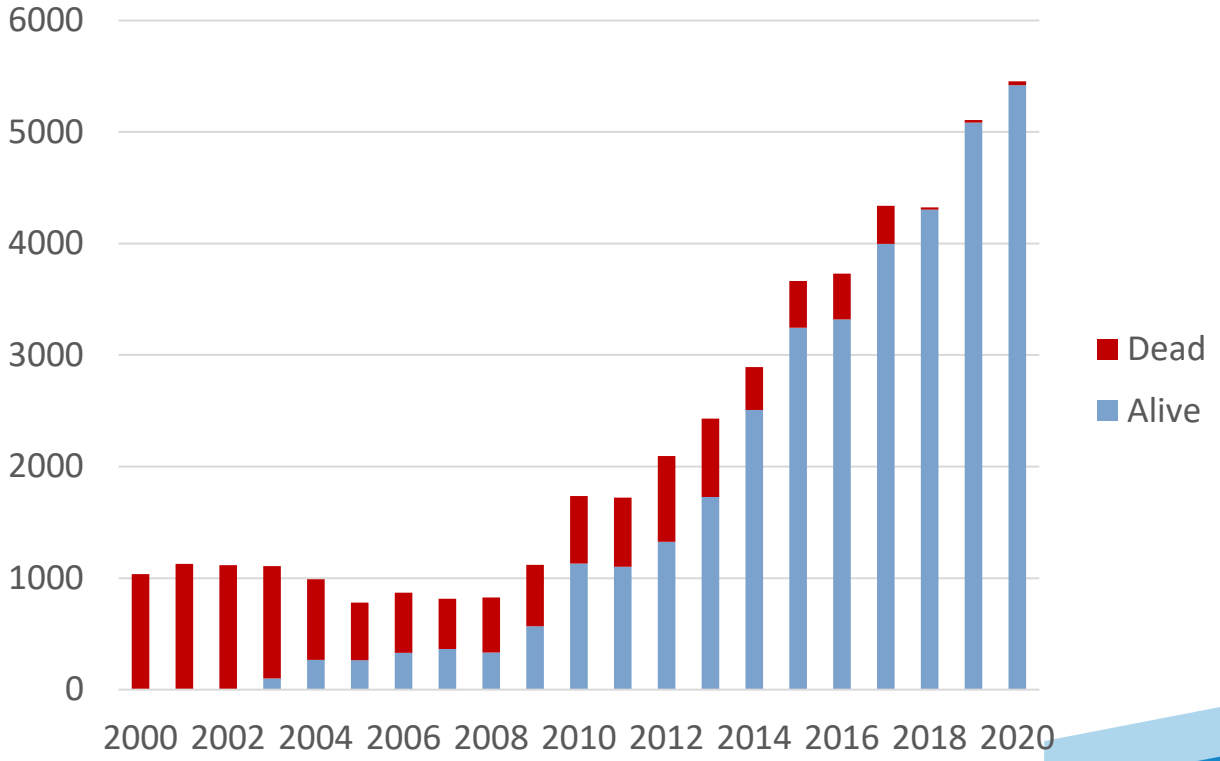
- Mar 4, 2020 X wins arbitration, sending Levandowski to bankruptcy, Calif state court $179 million award against Levandowski
- Mar 19, 2020 Levandowski reaches a plea deal with federal prosecutors – pleads guilty to one count of trade secret theft
- Aug 4, 2020, Federal Judge sentences Levandowski to serve 18 months in prison. Prison sentence start is delayed because of covid-19
- Jan 20, 2021, hours before leaving office, President Donald Trump fully pardons Levandowski
- Levandowski still in bankruptcy court for release of more than $1.5 million in legal fees he owes his attorneys for representing him in the criminal case.

Tesla v. Dr. Guangzhi Cao

- Autopilot engineer Dr. Cao leaves Tesla in early 2019 to work for XMotors.ai, Inc. Chinese self-driving car startup company
- Tesla sues Dr. Cao March 2019 alleging he downloaded entire repositories of Tesla's Autopilot source code to his iCloud account and copied it to two personal computers, a thumb drive and an external backup drive
- After Tesla files suit, XMotors puts Dr. Cao on leave. As of August 2021 Dr. Cao does not work there anymore
- Dr. Cao first made excuses, and argued he had deleted the Tesla files
- April 2021, the parties dismissed the suit, Dr. Cao admitted to the downloading, agreed to pay an undisclosed amount, and apologized
- XMotors?

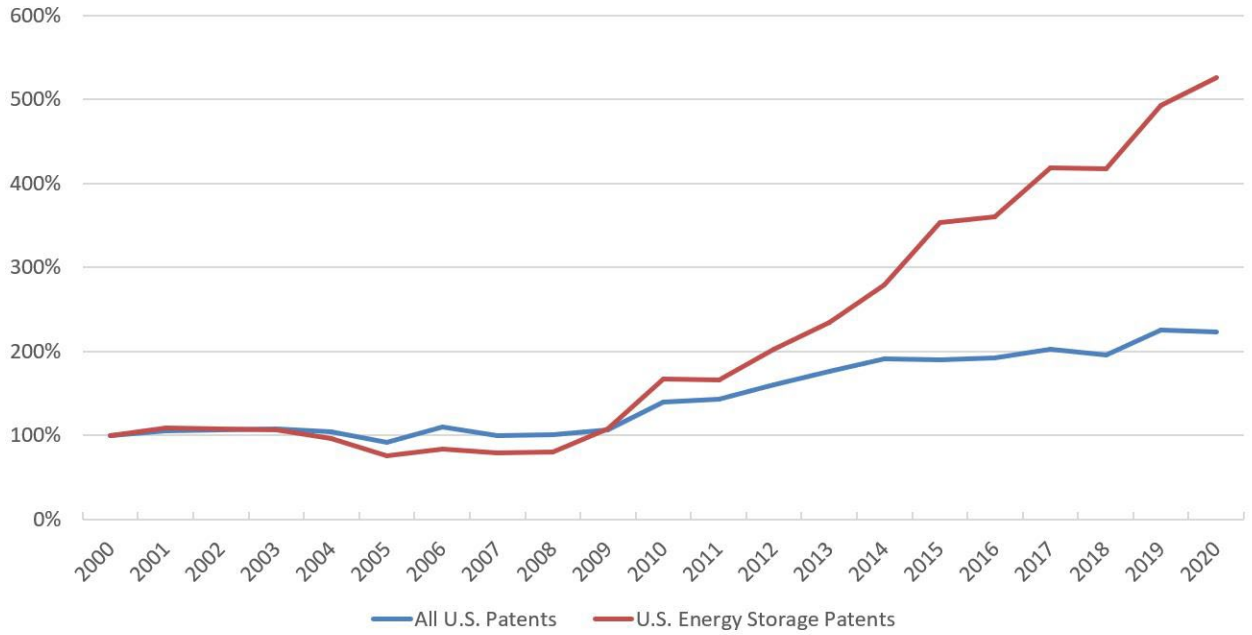
Trends in U.S. Energy Storage Innovation

Energy Storage U.S. Granted Patents, 2000-2020



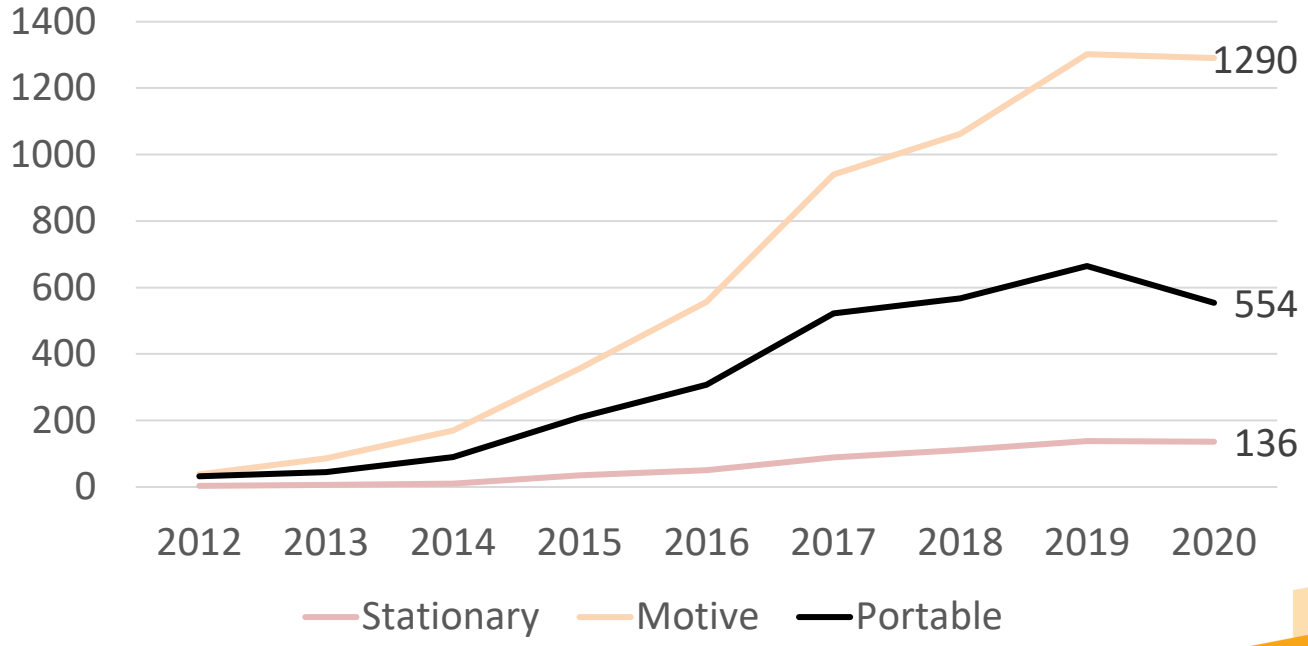
Trends in U.S. Energy Storage Innovation

U.S. Granted Patents 2000-2020, Percent increase over time



Trends in U.S. Energy Storage Innovation

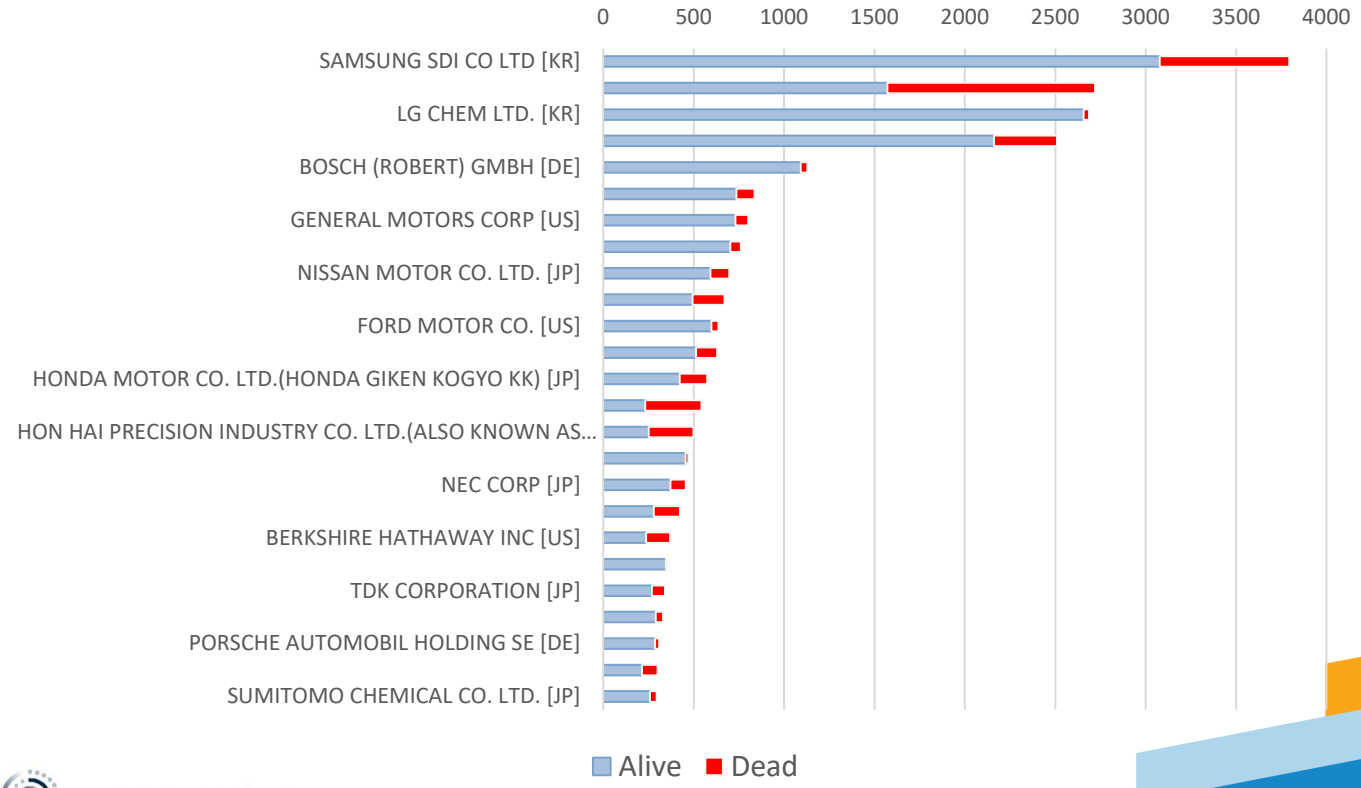
US Granted Patents, End Use of Battery Technology, Patent Count vs. Publication Year



* Prior to 2013 the US patents were classified using a different system (USPC vs. today's CPC).

Trends in Energy Storage Innovation

U.S. Granted Patents, Top Assignees vs. Patent status



informa markets

#TBS22 #EVT22

Trends in Energy Storage Innovation

US Granted Patents, Top Assignees vs Grant Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SAMSUNG	8	32	30	37	28	40	57	56	126	259	287	253	348	515	595	473	438	370	407	343
TOYOTA MOTOR	25	38	56	48	40	41	32	41	63	99	140	258	236	280	247	214	281	345	374	408
LG CHEM	0	4	3	8	5	2	13	9	57	69	77	68	110	159	253	209	269	260	344	475
PANASONIC	75	64	93	81	62	69	48	82	92	146	120	181	124	107	103	119	93	107	99	148
HONDA MOTOR	24	27	50	68	67	90	76	73	74	127	91	107	75	91	98	102	94	88	108	108
GM GLOBAL	11	27	31	35	37	28	45	58	66	138	145	123	207	175	175	133	92	65	102	76
SANYO ELECTRIC	39	57	50	43	34	24	32	34	35	55	45	78	62	33	38	40	52	48	72	42
ROBERT BOSCH	0	0	7	1	9	6	6	7	13	21	15	32	73	134	169	140	151	96	131	93
HYUNDAI MOTOR	3	4	1	4	5	8	4	3	6	18	17	27	36	58	64	103	97	130	153	153
TOSHIBA	10	17	13	17	14	18	16	16	32	45	42	43	48	37	33	52	57	48	80	65
NISSAN MOTOR	5	11	22	22	26	36	38	31	36	39	35	41	48	58	61	79	102	76	111	69
MURATA MANUFACTURING	21	20	13	17	7	29	22	18	21	48	26	34	27	73	93	67	103	80	67	69
SONY	15	20	22	32	15	37	33	28	39	48	35	42	48	30	21	17	23	16	9	14
KIA MOTORS	0	0	0	0	0	2	0	0	2	3	3	11	14	22	30	22	23	25	72	127
FORD GLOBAL	8	7	4	6	5	6	4	2	5	5	6	12	13	18	35	77	99	87	110	115
GS YUASA INTERNATIONAL	15	15	13	9	5	8	3	4	11	7	13	14	13	25	60	62	64	80	60	61
GENERAL ELECTRIC	5	1	9	8	11	13	7	7	16	21	18	20	14	17	25	8	16	15	12	8
COMMISSARIAT AL ENERGIE ATOMIQUE	1	2	2	0	0	2	7	3	10	23	19	22	28	33	43	39	38	43	50	40

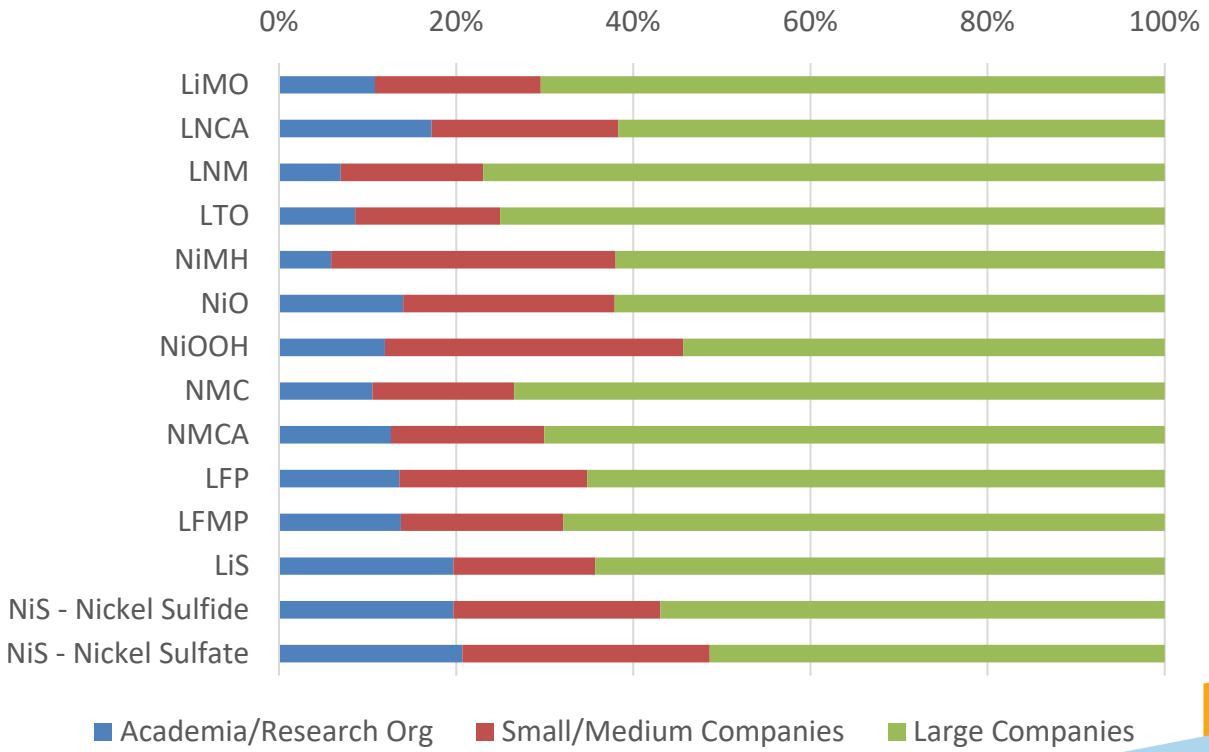
Trends in Energy Storage Innovation

US Granted Patents, Earliest Priority Country vs. Grant Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
US	808	766	857	818	734	735	695	684	833	1172	1153	1191	1312	1477	1647	1606	1734	1729	1923	2109
JP	477	604	601	611	488	587	536	574	700	1009	944	1286	1154	1219	1351	1420	1606	1631	1866	1880
KR	36	55	46	52	50	62	81	86	194	367	400	388	507	700	871	747	841	847	1011	1086
DE	75	86	116	109	84	81	70	87	76	119	98	98	114	127	176	186	273	224	267	317
CN	3	2	3	5	1	4	4	7	17	35	57	130	104	91	112	100	130	138	206	309
WO	12	13	16	19	15	16	15	9	15	23	30	66	115	170	183	205	253	218	229	213
FR	28	38	15	17	9	10	20	18	24	51	48	50	62	77	96	95	101	98	111	78
GB	16	23	27	13	15	14	20	25	19	26	25	31	33	32	41	43	73	55	81	59
EP	16	18	12	15	16	19	11	24	15	33	30	34	46	57	62	58	86	88	118	116
TW	9	8	11	16	16	19	20	17	33	41	44	60	56	49	63	62	34	41	58	78
IT	3	5	8	6	6	6	5	8	5	10	12	10	9	14	15	13	10	14	7	11
CA	10	12	13	13	15	7	14	8	7	8	8	9	5	8	3	11	8	7	6	5
SE	9	3	6	4	3	4	2	3	3	4	2	1	2	4	2	4	4	2	3	9
AU	3	4	6	7	4	6	3	6	6	4	8	3	3	2	6	2	5	7	5	10
AT	0	1	1	3	1	1	0	2	2	0	1	5	3	6	5	4	3	4	8	3
NL	3	4	3	4	2	1	3	1	1	3	0	0	0	3	2	1	3	2	3	1
IN	0	0	0	0	0	0	0	0	0	1	0	0	2	2	7	5	7	12	14	8
DK	5	3	0	2	2	0	1	1	4	3	2	7	4	4	4	1	1	0	1	2
IL	3	4	0	1	1	1	0	1	4	2	0	0	3	1	0	1	2	1	1	3
ES	1	2	1	1	1	1	1	0	1	0	0	0	2	2	1	0	0	1	3	1

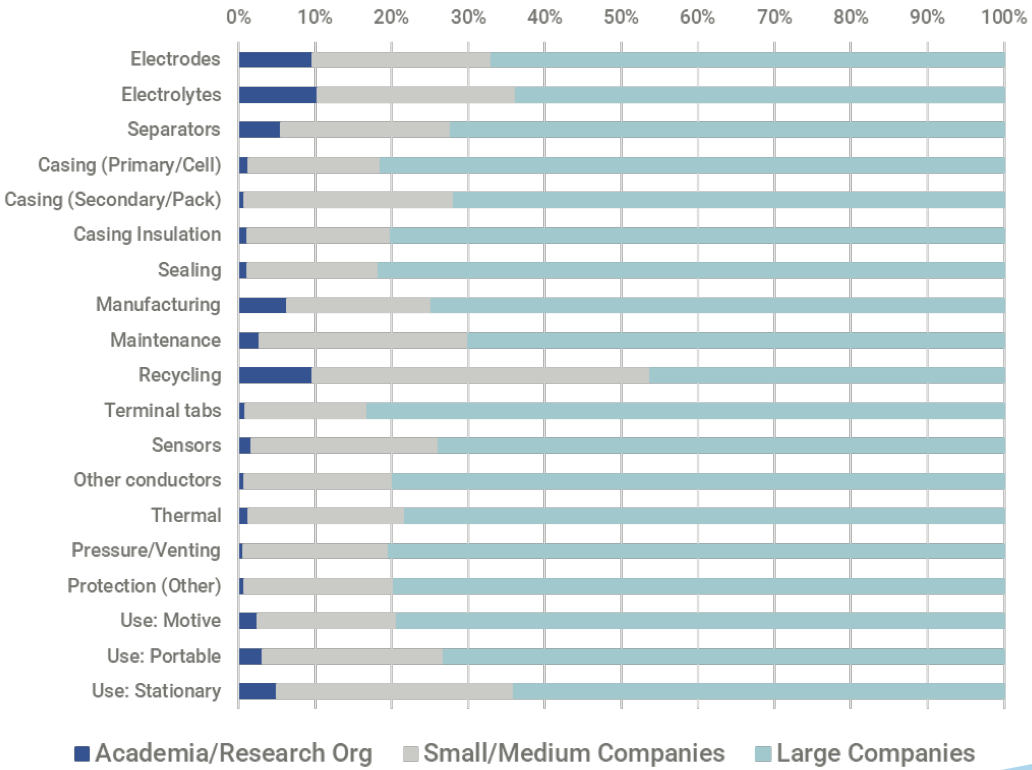
Trends in Energy Storage Innovation

US Granted Patents, Electrode Chemistry vs. Assignee Type



Trends in Energy Storage Innovation

US Granted Patents, Technical Category vs. Assignee Type



Trends in Energy Storage Innovation

US Granted Patents, Top Assignees vs. Technical Category

Assignee	Materials/ Chemistry			Casing				Life Cycle			Integrated Electronics			Protection			End Use			Grand Total
	Electrodes	Electrolytes	Separators	Casing (Primary/Cell)	Casing (Secondary/Pack)	Insulation	Sealing	Manufacturing	Maintenance	Recycling	Terminal tabs	Sensors	Other Conductors	Thermal	Ventilation	Other	Motive	Portable	Stationary	
SAMSUNG SDI CO LTD	2069	560	331	1185	676	29	218	1491	1007		820	613	1455	440	362	397	351	289	24	12317
LG CHEM LTD.	1708	503	318	591	725	65	122	1123	813	2	337	494	705	436	146	186	625	326	144	9369
PANASONIC CORPORATION	1793	583	220	452	367	35	106	972	693	7	240	343	551	207	185	123	190	77	14	7158
TOYOTA MOTOR CORP	1533	677	160	264	351	25	73	861	742	27	155	419	362	305	127	68	533	41	1	6724
BOSCH (ROBERT) GMBH	463	113	76	280	342	29	43	319	394	3	207	297	398	222	138	115	261	40	10	3750
MURATA MANUFACTURING CO. LTD.	697	368	125	174	103	4	29	394	280	1	95	122	148	45	19	23	140	133	58	2958
TOSHIBA CORP	544	191	70	100	127	3	19	212	223	4	59	93	123	42	18	19	153	16	9	2025
GS YUASA CORPORATION	378	70	79	161	117	11	29	231	157		115	92	217	55	38	29	131	12	7	1929
NISSAN MOTOR CO. LTD.	433	111	86	104	118	3	30	256	171	1	70	102	118	65	22	20	173	6	2	1891
GENERAL MOTORS CORP	423	115	76	26	107	22	3	163	260	3	21	148	88	165	3	11	206	13	4	1857
FORD MOTOR CO.	114	34	24	36	265	31	4	66	221		41	141	104	257	30	15	419	2	1	1805
SAMSUNG ELECTRONICS CO LTD	486	222	69	52	81		17	212	220		20	93	37	19	5	6	51	91	4	1685
SONY CORP	259	130	25	107	162	1	6	118	272		102	114	144	23	12	46	29	97	10	1657
NEC CORP	316	120	28	82	41		28	164	149	1	45	65	76	17	23	9	60	26	10	1260
CPS TECHNOLOGY HOLDINGS LLC	143	14	22	64	114	18	6	79	121	9	67	95	102	71	52	32	157		11	1177
HONDA MOTOR CO. LTD.(HONDA GIKEN KOGYO	195	92	7	29	191	4	8	47	137	1	19	78	69	106	9	7	141	6	1	1147
HYUNDAI MOTOR CO.	198	71	24	39	69	11	3	76	128		26	78	57	116	25	23	168	4	2	1118
HITACHI LTD	241	56	12	37	52	6	4	80	176	4	25	130	68	32	22	9	81	5	4	1044
CONTEMPORARY AMPEREX TECHNOLOGY LTD	115	25	11	86	94	7	21	97	74		63	82	106	53	54	21	92	6	5	1012
SEMICONDUCTOR ENERGY LABORATORY CO. LT	292	71	35	57	18		4	213	86	1	19	13	25	7	3	2	50	104	3	1003
SUMITOMO ELECTRIC INDUSTRIES LTD.	111	65	13	29	116	4	7	49	102		59	85	165	31	5	39	114	3	5	1002
TDK CORPORATION	273	63	42	57	28	4	11	145	74		38	27	68	17	11	13	9	16	1	897
YAZAKI CORPORATION	13	1	1	17	115	2		10	137		54	134	198	21	5	30	112	4	1	855

Trends in Energy Storage Innovation

US Granted Patents, Top Assignees vs. Electrode Chemistry

Assignee	Oxides									Phosphates		Sulfates			Grand Total
	LiMO	LNCA	LNM	LTO	NiMH	NiO	NiOOH	NMC	NMCA	LFP	LFMP	LiS	NiS	NiS04H206	
LG CHEM LTD.	150	2	16	137	3	95		154	15	141	3	39	1	8	764
TOSHIBA CORP	94	6	21	203	2	31	2	62	2	34	20	4	5	1	487
SAMSUNG SDI CO LTD	95	24	12	52	2	44		71	28	52	12	29	9	6	436
GLOBAL GRAPHENE GROUP INC	45		3	55		46		41	59	40	40	83	1	7	420
PANASONIC CORPORATION	69	9	15	27	33	44	12	50	2	11		1	6	5	284
NANOTEK INSTR INC	29		2	36	1	30		25	30	28	28	41	1	3	254
BOSCH (ROBERT) GMBH	30	26	1	27		3		11	20	31	2	38	1		190
TOYOTA MOTOR CORP	41		16	18	13	11	1	49	1	24	2	7	2		185
MURATA MANUFACTURING CO. LTD.	40		8	19	2	9		29	17	19	2	9	4		158
GENERAL MOTORS CORP	27	2	1	20	3	9	1	24	3	19	8	24	3	4	148
SAMSUNG ELECTRONICS CO LTD	21	3	2	21	1	35		17	10	19	4	8	5		146
HON HAI PRECISION INDUSTRY CO. LTD.(ALSO KN	18		2	15		19	1	13	5	27	8	12	1	2	123
TSINGHUA UNIVERSITY	17		2	17		15		11	3	27	8	15	1	2	118
SEMICONDUCTOR ENERGY LABORATORY CO. LTI	18		3	4		7		24	1	35	6	1	1	1	101
UNIVERSITY OF CHICAGO	36		1	4		6		8		13	1	18	2	1	90
COMMISSARIAT A L'ENERGIE ATOMIQUE	17	3	3	14		7	1	4	1	28		9	2		89
CPS TECHNOLOGY HOLDINGS LLC	17	9	1	17	9			13	6	9	1				82
WANZIANG GROUP	17	3		9		7		11		31	3				81
NISSAN MOTOR CO. LTD.	34	1	2	1		2		31	1	2		6			80
TORAY INDUSTRIES INC.	1			34		34		6		4					79
SUMITOMO METAL MINING CO. LTD.	19	2	6	1	2	8	6	20				1	3	6	74
GREATBATCH LTD. (NEW YORK CORPORATION)	16					25		33							74
MITSUBISHI CHEMICAL HOLDINGS CORP.	15		3	19		5		27		1		2			72

Filing Trends from the US

Takeaways:

- White Space
  - Recycling, thermal management, and any thing that is not Li-Ion
  - And Non Li-Ion is popular for filing in the US
  - Non-motive applications – stationary
- Levelling bets between NMC and LFP
- Ever increasing filings in the US that were invented outside the US
- The 5x increase in patent filings in the last decade is does not show signs of slowing down

IP and Opportunities in the Batteries Space

- **Target markets**
  - The greatest patent filing activity in Europe is happening in Germany, France, Austria, UK and Italy. The US is clearly of interest to Asia and other countries of origin.
  - Therefore, if you aren't filing or acting in these territories, should you be?

Thank you!

Questions?