Electrical Vehicles & Battery Market - Technology, IP Strategy & Litigation

Author: Nethravathi D
IPpro Services India LLP

ipproinc.com

Electric Vehicle (EV) Battery

Battery and charging systems are key components of an EV and hybrid electric vehicle (HEV), ***that store and deliver electrical energy, enabling zero-emission transportation.*** ***Lithium-ion batteries*** are the most widely used type of EV batteries, as they have a **high energy density**.

Why are there different EV battery types?

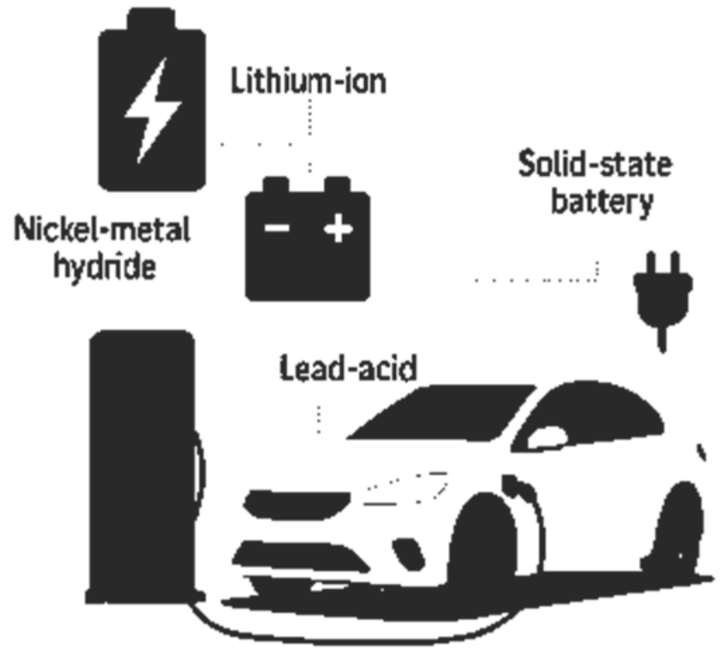
Different EV battery chemistries optimize different parameters

- Life span
- Charging Speed
- Energy storage

Lithium-Ion Batteries			
LFP		**NMC**	
Lithium Iron Phosphate		**Nickel Manganese Cobalt**	
Pro	Cons	Pro	Cons
Cheaper to source and build	Lower energy density	More energy density	Degrades quickly in heat or high voltage
Doesn’t rely on conflicted material (Cobalt)	Shorter range for same size battery	More power & range	Relies on conflict materials
More durable to heat and high voltage	Slower charging in the cold	Can charge faster	More expensive to build
Slower degradation			

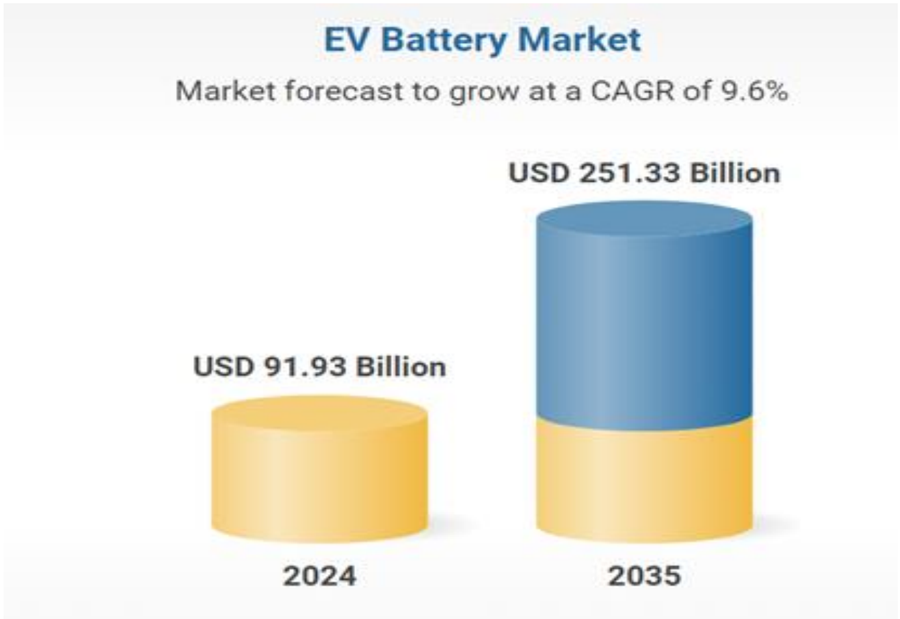
Types of EV Batteries

Types	Benefits	Drawbacks
Lithium-ion	High energy density, high power-to-weight ratio, efficient, safe & durable	Expensive, sensitive to temperature, need careful management
Nickel-metal hydride	Cheaper, more reliable, longer life span, more life cycles	Lower energy density, lower power–to-weight ratio, heavier
Lead-acid	Cheap, easy to recycle	Low energy density, lower power to weight ratio, less durable, less safe
Sodium-ion Batteries	Cheaper	Low energy density, lower power to weight ratio, still in the development phase, used for low range EV's
Solid State Batteries	High energy density, faster charging, more life cycles, reduced carbon footprint	Sensitive to temperature, lithium dendrite formation, Complex Manufacturing and Handling

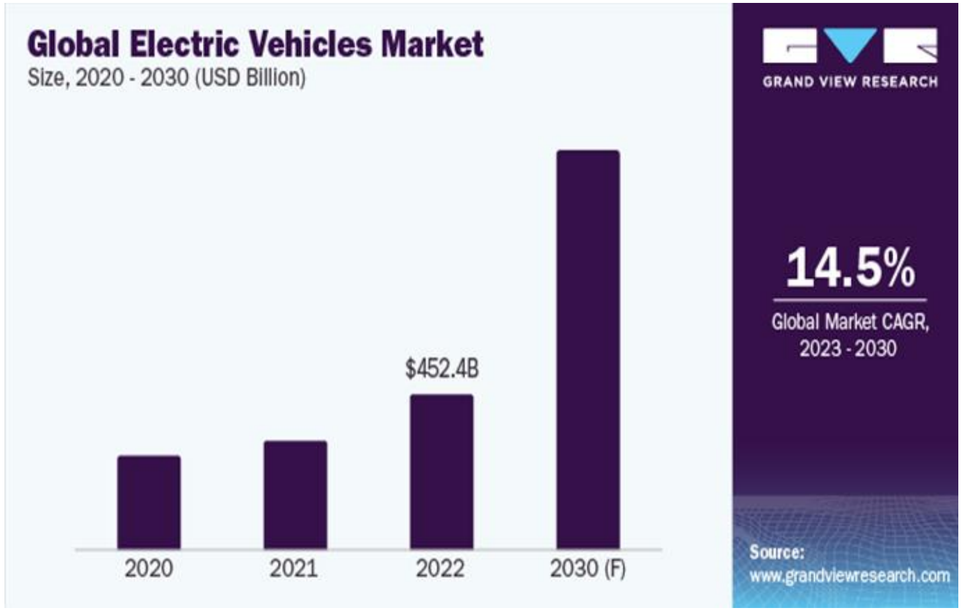


Global EV Battery Market

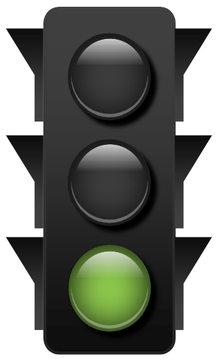
The global EV **Battery market** is projected to reach from **USD 91.93 billion in 2024 to USD 251.33 billion in 2035**, at a ***CAGR of 9.6% from 2024-2035***. (*Source EV Battery Industry Report) 2025*)



The global **electric vehicles** (EVs) category is expected to witness a **CAGR of 14.5% from 2023 to 2030**

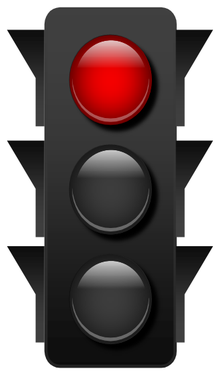


Market Drivers and Limitations



Drivers:

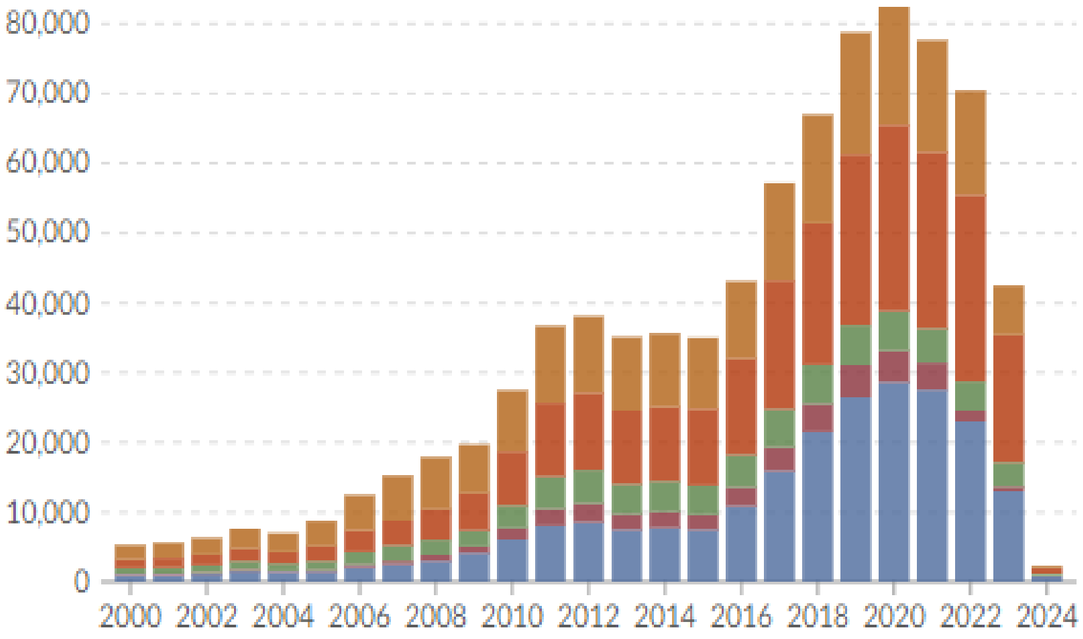
- ✓ Increasing EV adoption
- ✓ Governmental regulation on emission
- ✓ Subsidies & tax breaks
- ✓ Advance in battery technology
- ✓ Mobility as a service (MaaS) model



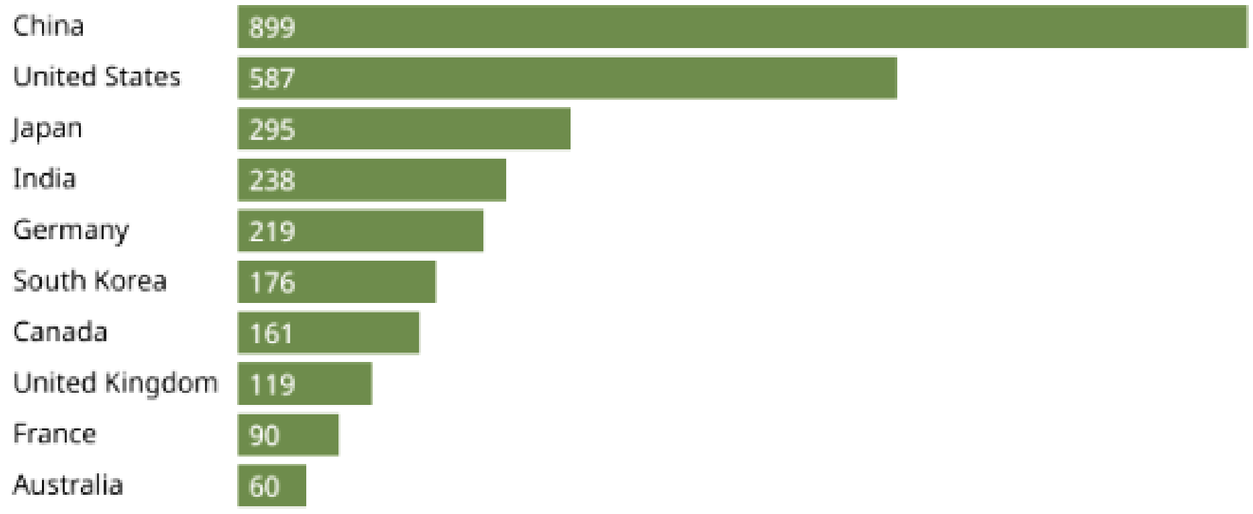
Limitation:

- ✓ Insufficient charging infrastructure
- ✓ Higher charging time
- ✓ Higher initial cost
- ✓ Shortage of raw materials for battery
- ✓ Recycling and sustainability concerns

Patent Trends signals the next wave of EV Technology



Annual patents filed for electric vehicle technologies, World – ourworldindata.org



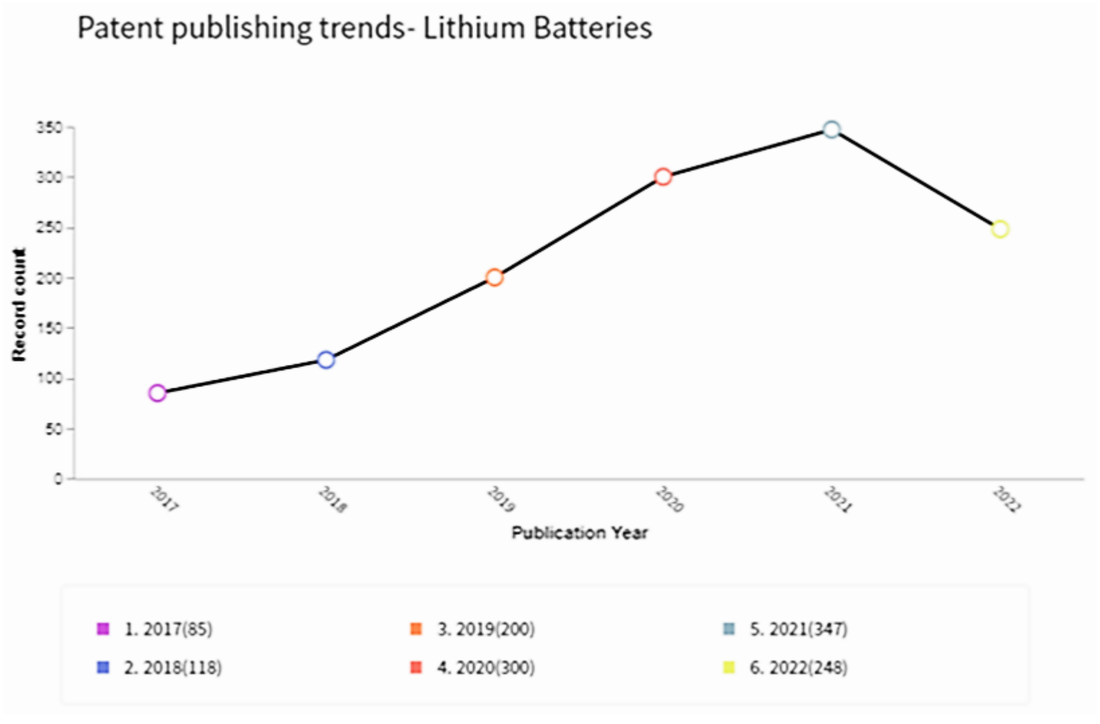
Source: WIPO, based on patent data from October 2024

- **EV machine tech.**
- **EV Storage**
- **EV management**
- **EV communication tech.**
- **EV Charging Stations**

China leads in **solid-state battery** publications with around 850, followed by the **US** with ~ 600, highlighting significant investment in the field.

Patent Trends – EV battery - India

There has been ***gradual increase*** since 2010 in patent filling for the inventions related to EVs. Year 2020, saw the publication of **highest number of grants** by the IPO.



(Derwent World Patents Index)

EV Vehicle & Battery Investment in India:

- India's auto component industry will see US$ **2.89-3.46 billion investment in FY26** for capacity expansion and EV parts, says ICRA. It is planning to assemble EV battery packs and install 100 charging stations for EVs. {*Source: EV Industry Report published by India Brand Equity Foundation}*
- **MG Motor** files design patent for Cloud EV in India – {Source: *manufacturing India May 2024}*
- **Tata Motors** Files **250 Patents** And **148 Design** Applications in Year 24-25. {Source: *Ackodrive.com Apr 2025}*

IP Strategy Unique to EV Battery Space – Tesla's Open-Source Pledge

Was it truly open source?

- **2014 Open-Sourcing**: Tesla made its patents open source
- **Not a Patent Abandonment**: This wasn't a total abandonment of patenting
- **Strategic Patent Filing**: Tesla continued to file patents for critical advancements including battery integration with overall vehicle.
- **Patent Beyond Battery Technology**: Manufacturing processes especially for Gigafactory.
- **Tesla's 'open-source philosophy'** comes with "**Good-faith"** conditions.
  - you ***do not enforce any right against Tesla***,
  - you ***do not enforce any patent right against another party using Tesla's technology,*** or
  - You ***do not copy Tesla's designs.***

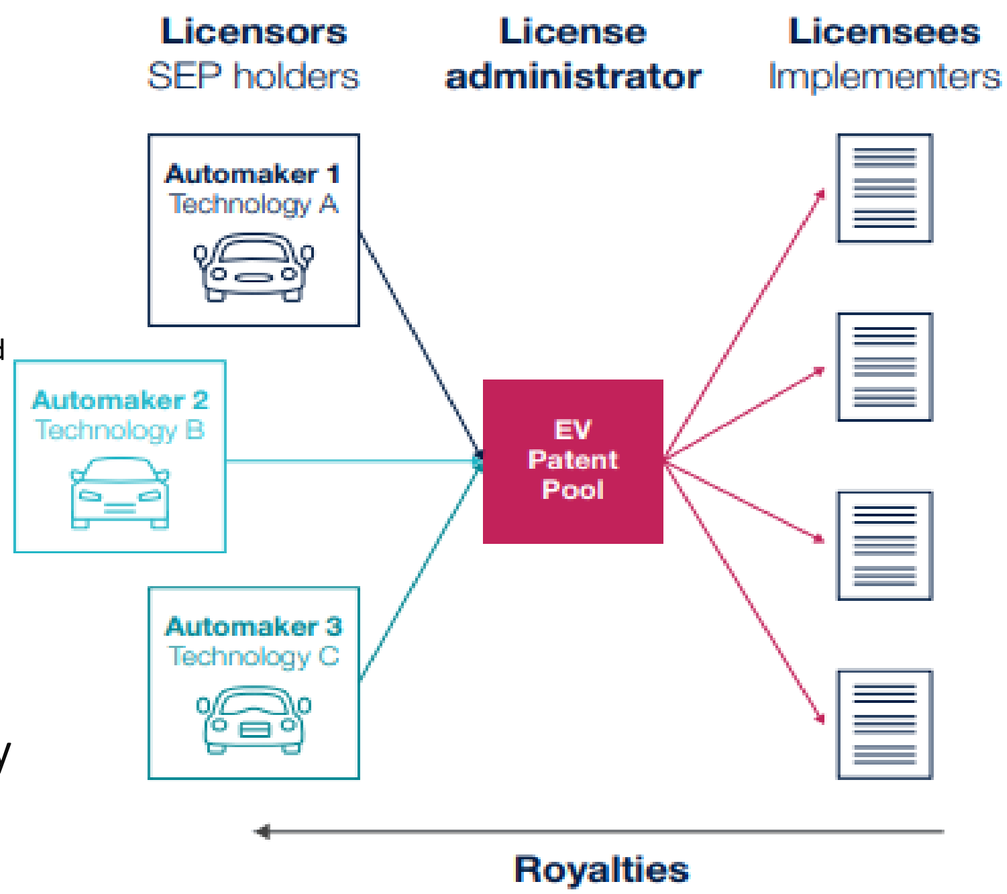
Where is Tesla focused this quarter?

Focus Area	Potential Technologies	Related Patents
AI- Driven Distance prediction	Neural network models, Machine Learning algorithms	WO2024073115A1, WO2024073033A1, WO2024073117A1, WO2024073741A1
Optimizing Neural Network Execution	Neural network Optimization, AI Processing Frameworks	WO2024073115A1
Automated Data Labelling For Navigation	Ai-Based Data Labelling, Machine Learning	WO2024073033A1
Simulating Viewpoint Prediction Algorithms	Simulation Models, Viewpoint Prediction Algorithms	WO2024073741A1

IP Strategy Unique to EV Battery Space – Patent Pool

Patent Pool:

- **Patent Pool Definition:** A collection of patents managed by an administrator
  - Administrator acts as an intermediary between patent owners and implementers.
  - Implementers license patents from the pool..
- **Purpose of Agreements:** SEP (Standard Essential Patents) & 3rd Party Licensing on FRAND Terms.
- **"One-Stop-Shop" Benefit**: Patent pools offer a single point of access for licensees to acquire all necessary rights.
- **Tulip Innovation:** A specific patent pool example
  - Formed by **LG Energy Solution** and **Panasonic Energy**
  - Licenses over **5,000 patents** related to lithium-ion battery technology to manufacturers worldwide



IP Strategy Unique to EV Battery Space – Licensing & Cross licensing

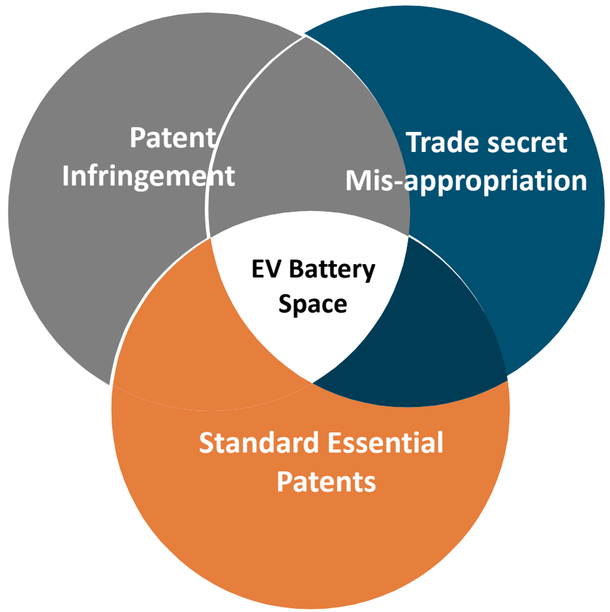
Licensing:

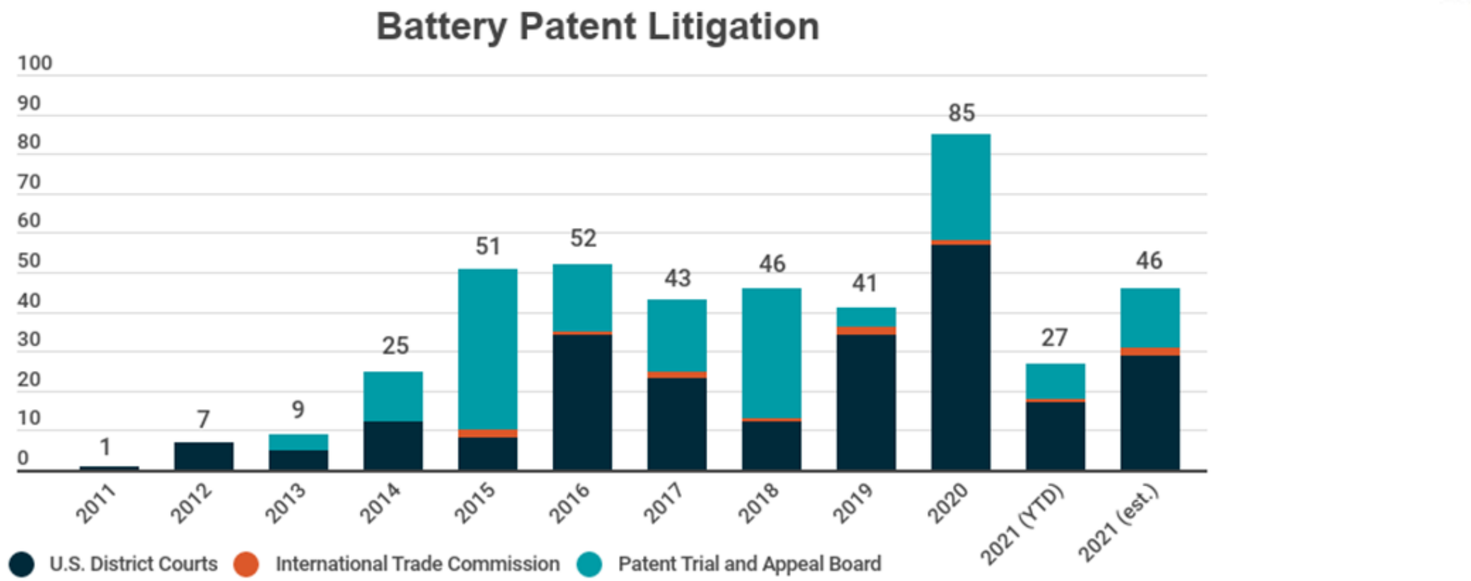
- **Royalty based Patent Licensing:** Granting access to 3rd party on battery components or manufacturing process.
- **Toyota's Licensing of IP:** Granted other manufacturers access to its IP under certain conditions by opening tens of thousands of patents regarding fuel-cell and hybrid technology.
- **Tesla Partnership with LG Chem**: Collaborated with LG Chem for battery supply, especially for its vehicles produced in China.

Cross-Licensing:

- **Often Royalty-Free Agreements:** Involves two or more companies granting each other licenses to use their respective patents, often without financial exchange.
- **Litigation Avoidance:** Avoid ongoing litigation, particularly in fields like connected infotainment and V2X connectivity.
- **Nokia and China's Oppo:** Resolved their disputes via a cross-license deal.
- **LG Chem and SK Innovation:** Agreed to cross-license battery patents allowing both companies to continue operating in the U.S. market.

IP Litigation in EV Battery Space





Source: Docket Navigator as of 8/6/21 – Fish

- **Patent infringement:** Cell design, Charging tech, Thermal control, Cathode/anode chemistry, Battery Management System (BMS) algorithms, Battery pack integration (e.g., Cell-to-Pack or Cell-to-Chassis).
- **Trade secret misappropriation**: Material recipes and formulations (electrode coatings, electrolyte additives), Battery testing, Diagnostics, Safety protocols, Manufacturing processes and Employee mobility.
- **Standard-essential patent (SEP):** Disputes for charging protocols & standards.

IP Litigation in EV Battery Space - Patent Infringement

From Factory Floors to Patent Courts:

High-stakes IP battles in EV/batteries are strategic moves for market growth, using lawsuits to drive collaboration and resolution.

CATL vs. CALB:

- CATL filed multiple lawsuits against CALB alleging Patent infringement. Sought damages of US $95.6M.
- CALB Counter sued for its Patent Infringement seeking higher damages of US $136M.
- **Strategic Motivation**: Beyond IP protection, used a strategic tool by CATL to maintain its market presence
- **Outcome**: **CATL and CALB settled the dispute** out of court in 2023 & CALB to pay a confidential settlement

IP Litigation in EV Battery Space - Patent Infringement

LG Chem vs. SK Innovation:

- Patent battle initiated in 2011 by LG Chem. Filed lawsuit against SK Innovation for infringement of inorganic material-coated separators.
- **Strategic Motivation**: LG Chem and SK Innovations agreed to withdraw the cases in US & South Korea in 2014
- **Outcome**: Agreed not to file patent suits (related to this patent) & cooperate in the electric vehicle battery business.

IP Litigation in EV Battery Space - Patent Infringement

Tulip Innovation: LG Energy Solution (LGES)/Panasonic vs. Sunwoda:

- Lawsuit involved infringement of Patents (EP 1829139 B1 and EP 2528141 B1) owned by LGES & Panasonic.
- Based on **battery separator technology** that ensures safety by preventing short circuits and enhances overall performance and longevity
- **Landmark Decision in Germany**: In May 2025, Court provided Injunctive Relief and ordered Sunwoda to destroy all batteries using this technology.
- **Outcome**: First Injunction in Germany for Car Batteries.

IP Litigation in EV Battery Space – Trade Secret Misappropriation

Not Just Patents! – Increasing trade secret litigation in the EV space as companies protect confidential information beyond Patents

Tesla Vs Rivian:

Allegation: In 2020, Tesla Sued Rivian alleging Trade secret misappropriation related to battery technology by Rivian **poaching former Tesla employees**.

Outcome: Tesla and Rivian reached a settlement, the details of which were not publicly disclosed.

LG Chem vs. SK Innovation:

Allegation: In 2019, LG Chem alleges that SK Innovation developed EV batteries by buying of the Trade secret from former employees.

Present Status: settled in April 2021, with SK Innovation paying LG Energy Solution **$1.8 billion** in cash & royalties.

IP Litigation in EV Battery Space – Trade Secret Misappropriation

Tesla, Inc. v. Matthews International Corporation

Allegation: In June 2024**,** Tesla sues ex-supplier Matthews over EV battery (Dry Battery Electrode) trade secrets.

Present Status: As of April 2025, Matthews won the arbitration to continue selling DBE and the US District court has denied Tesla's Emergency TRO (Temporary Restraining Order).

IP Litigation in EV Battery Space – Standard Essential Patents (SEP)

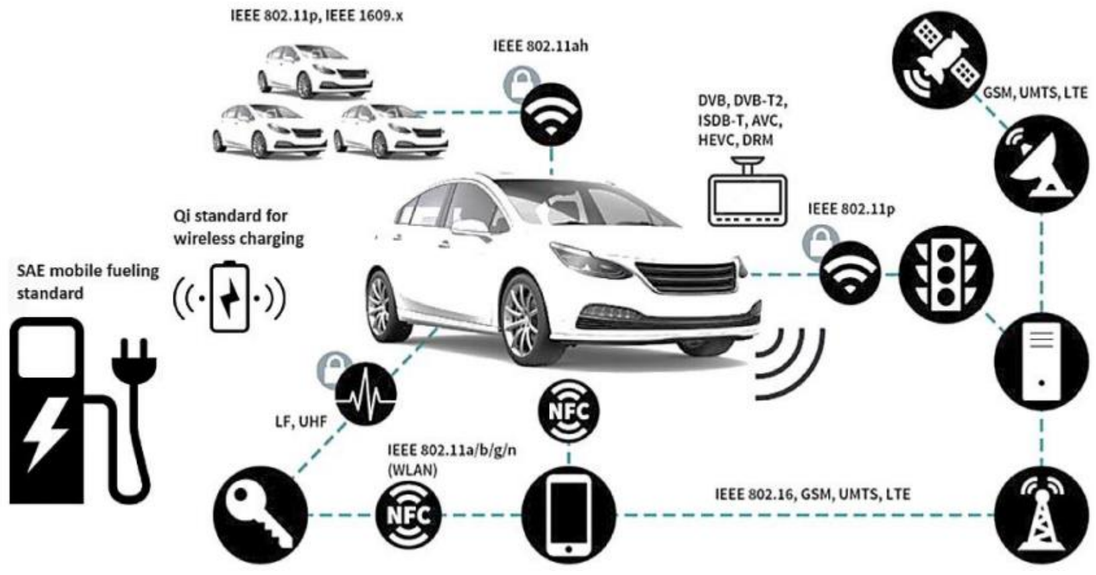
Standards: A standard provides a set of technical requirements and guidelines that enable different components to interoperate using a common technological language.

Such as for EV Charging - Combined Charging System (CCS) / SAE J1772

SEP's: Patents that claim a standard (i.e., implementing the standard necessarily infringes the patent)

SEP Holders in EV Battery:

- **LG Innotek:** Several SEPs related to EV charging control, battery status monitoring, & charging reservation technologies.
- **Qualcomm** Halo system with inductive charging to power EV's without direct physical contact.
- **Bosch and Siemens:** hold SEPs related to charging infrastructure.
- **CATL and Panasonic:** hold SEPs for battery manufacturing.



IP Litigation in EV Battery Space – SEP Challenges

Patent/Royalties:

- **Patent Hold Up:** SEP holders tend to demand excessive royalties for using a particular standard.
- **Royalty Stacking:** Several SEPs for a single technology, may lead to cumulative royalty demands from SEP holders leading to unpredictable costs on products.

Licensing Disputes:

- **FRAND Disputes:** Licensing SEPs often involve disputes over **f**air, **r**easonable, **a**nd **n**on-**d**iscriminatory (FRAND) terms.
- Challenges arise due to differing industry norms and legal jurisdictions issues, including SEP's enforceability

Role of Standard Setting Organization in SEP's:

- **Frand Terms for Licensing** - FRAND obligations restrict the amount of royalty rate SEP owners can receive.
- **SSO policies:** can prohibit SEP owners from certain enforcement activities like injunction until good-faith effort has been negotiated between the parties.

Conclusion - IP as the New Frontier of EV/Battery Competition

The Interplay between Intellectual Property & the Electric Vehicle Industry is undeniable!

Key Takeaways!

- **Grasp Industry-Specific Challenges**: Recognize the unique complexities that interplay in specific industries like Pharma, EV and Telecom.
- **Decipher IP's Critical Role:** Understand the specific contributions of patents (utility & design) and trade secrets & Trademark to the specific industry.
- **Craft Tailored IP Strategies:** Develop unique IP strategies as tools for competitive advantage and market expansion. Learn from diverse approaches like Tesla's Open-Source initiative or Tulip Innovation's (LGES & Panasonic) patent pools.
- **Anticipate Emerging IP Hurdles**: Be aware that every industry encodes unique challenges like the Standard Essential Patents (SEPs) present to the EV industry. Hence, Prioritize early patent filings in these crucial segments.

While every industry is unique, strategic IP learning consistently paves the way for effective solutions.

ip pro

THANK YOU!

To know more visit www.ipproinc.com

ask@ipproinc.com

Bangalore

102, Prestige Loka, 7/1, Brunton Road,
Bangalore- 560 025, INDIA.

+91 80 6693 5000

Mumbai

93-B Mittal Court, Nariman Point,
Mumbai- 400 021, INDIA.

+91 22 6669 5000

Silicon Valley

220 California Ave, Suite 201,
Palo Alto, CA- 94306, USA.

+1 650 325 7100