

# OVERVIEW

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## CEO's Message

### Dear Stakeholders of Samsung SDI,

In 2022, we were presented with ever greater uncertainties in the global business landscape amid the sustained COVID-19 pandemic, the spread of protectionism, and global supply chain disruptions.

Nonetheless, all of us at Samsung SDI, from employees to partners, strongly aligned ourselves towards our commitment to 'Super-gap' technology competitiveness, the best quality, and profitable qualitative growth, and such worthy efforts allowed us to surpass KRW 20 trillion in revenue and post KRW 1.8 trillion in operating profit.

Last year, we reached yet another significant milestone in laying the groundwork to bolster our ESG management in a systematic and ongoing way. To drive our sustainability efforts, we announced our long-term sustainability management strategy and established the Sustainability Management Committee within the Board. Moreover, we declared our commitment to 'Environment-Friendly Management' and joined RE100, a global renewable energy initiative, to do our part in tackling the global climate crisis.

Our top priority for 2023 will be to disseminate ESG management across our supply chains and the whole of our value chain. From this year on, we will disclose our Scope 3 emissions, other indirect greenhouse gas emissions generated along a company's value chain, and we will assess ESG risks across all our global operations and supply chains.

Meanwhile, Samsung SDI will earnestly strive to fulfill our social responsibility for the environment, safety and compliance. We will also gain greater trust through promotion of mutually-beneficial cooperation with our partners and a harmonious co-existence with our local communities, genuinely reaching out to our stakeholders on an ongoing basis.

At Samsung SDI, we firmly believe in the value of diversity and inclusion in every area of our business conduct. Any form of discrimination on the grounds of gender, religion or nationality is strictly prohibited across all our global operations, and every individual is provided with equal opportunity to pursue growth as one united team.

We look forward to your bountiful encouragement and support as we stride towards 'making the world greener and sustainable through our innovative technology' and becoming a global top tier company by 2030.

Thank you.

**Yoonho Choi**  
President & CEO, Samsung SDI



# Company Overview

## Samsung SDI at a Glance

Since its foundation back in 1970, Samsung SDI produces and sells rechargeable batteries used for electric vehicle, IT device, and Energy Storage System (ESS) applications as well as materials for semiconductors and displays. We commit to securing super-gap technology through transformation and innovation to shape a sustainable, eco-friendly future society.

Company name	Samsung SDI Co., Ltd
CEO	Yoonho Choi
Establishment	January 1970
Headquarters	150-20, Gongse-ro, Giheung-gu, Yongin City, Gyeonggi Province, Korea
Total No. of shares outstanding (common shares)	68,764,530 shares
Total workers	30,716
Shareholders with 5% or more ownership (as of Dec. 31, 2022, common shares)	Samsung Electronics: 13,462,673 shares (19.58%) National Pension Service: 5,449,458 shares (7.92%) BlackRock Fund Advisors: 3,444,030 shares (5.01%)

## Global Network

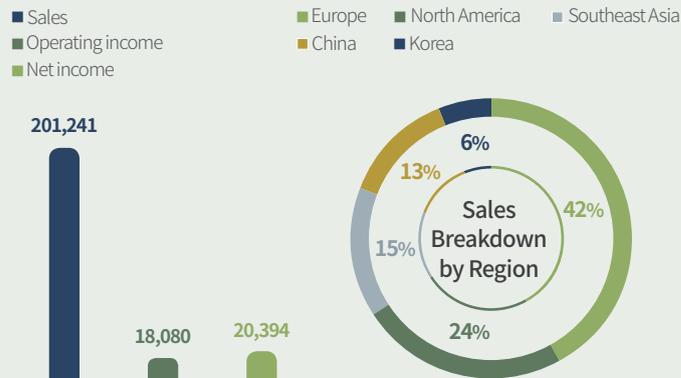
Samsung SDI's global network consists of 31 locations in total, including the Headquarters, the R&D Center, production facilities and sales bases.

Headquarters	1
Production Subsidiaries	12
Sales Subsidiaries/Offices	13
R&D center	5
<b>As of April 2023</b>	<b>31</b>
locations in total	



## Financial Performance

(Based on 2022 consolidated financial statements, unit: KRW 100 million)



## External Assessments Made on Samsung SDI

**MSCI**  
ESG RATINGS

Received A in ESG rating in 2023 for 4 consecutive years

**GLOBAL 100**

Ranked 63<sup>rd</sup> in 2023, listed for 6 consecutive years

Member of **Dow Jones Sustainability Indices**

Listed on the DJSI World for the 18<sup>th</sup> time in 2022

**CLEAN200**

Ranked 38<sup>th</sup> in 2023, listed for 5 consecutive years

**CDP**  
DISCLOSURE INSIGHT ACTION

2022 Climate Change Score: A-

1) Supervised by MSCI (Morgan Stanley Capital International)  
 2) Supervised by S&P Dow Jones and RobecoSAM  
 3) Supervised by the CDP (Carbon Disclosure Project)  
 4), 5) Supervised by Corporate Knights

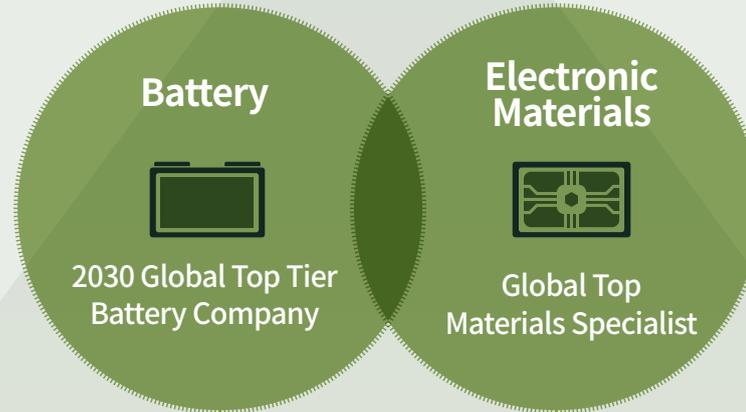
# 2030 Company Vision

Samsung SDI established a new 2030 vision to evolve into a global top-tier company by 2030. Everyone at Samsung SDI move towards the vision of 'To make the world greener and sustainable through our innovative technology'

Vision Statement

## TO MAKE THE WORLD GREENER AND SUSTAINABLE THROUGH OUR INNOVATIVE TECHNOLOGY

Business Goal



Mission & Strategy

### TECHNOLOGY INNOVATION

Secure super-gap technology and differentiated products

### PROFITABLE GROWTH

Pursue profitable qualitative growth

### OPERATIONAL COMPETENCY

Strengthen global operational competency and create a premier corporate culture

### SUSTAINABILITY LEADERSHIP

Bolster ESG management and seek win-win partnerships

# Business Overview

## Automotive Battery

### Business Summary

As the sales of xEVs continued to grow rapidly to account for over 10% of global automotive sales in 2022, Samsung SDI is leading the charge in the transition to xEVs by developing innovative battery technology. We secure super-gap technology competitiveness and differentiate products to position ourselves as an xEV battery leader, and supply high-efficiency, high-capacity Li-ion batteries to global automotive OEMs to help minimize the environmental impact of internal combustion engine vehicles.

### Application



#### Electric Vehicle (EV)

We deploy materials that deliver optimal service life and high-capacity features and design optimized battery components to pursue innovation in extending the driving range of EVs.



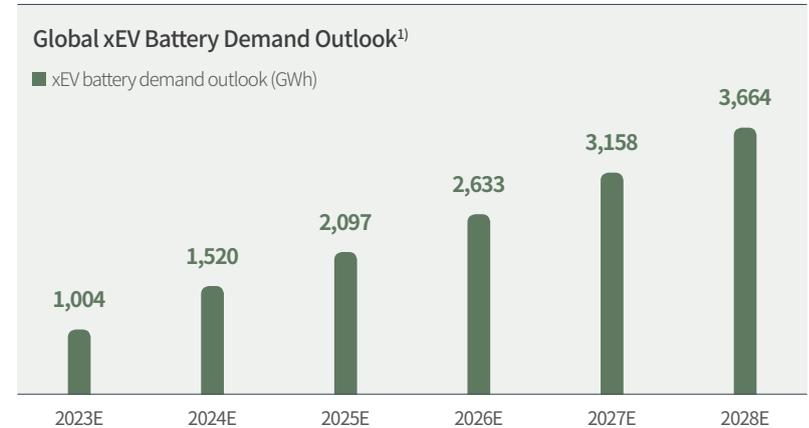
#### Plug-in Hybrid Electric Vehicle (PHEV)

As it is essential to strike the right balance between energy density required for electric-mode driving and power density that supports the engine operation, we are in constant search for the optimal point of balance by staying ahead of the competition in developing battery technology.



### Market Outlook

In 2022, the sustained pandemic, supply chain disruptions caused by the Russo-Ukraine war, and inflationary pressure stalled the growth of the overall automotive market. Still yet, xEV sales continued to increase to surpass 10% of total automotive sales. In Europe, tightening carbon emissions regulations drive the continuous growth of the xEV market while the IRA (Inflation Reduction Act) of the US is expected to spur the nation's xEV market. In China, it is forecast that new energy vehicles will make up 30% of new vehicles in 2023. Global EV makers plan to launch a range of new EV models in line with the initiatives undertaken by key countries to phase out internal combustion engines. Naturally, the xEV market will maintain its growth momentum, with annual xEV sales exceeding 46 million by 2028 to account for nearly 46% of the total automobile market.



1) EV and PHEV combined

\* Source: Samsung SDI forecast (as of May 2023)

# Business Overview

## ESS Energy Storage System

### Business Summary

Samsung SDI applies our technology and manufacturing process tested and proven in our EV battery business to ESS battery to secure high market shares and deliver reliable product quality. This ensures that we leverage our best-in-industry battery design competency and standardized modules to create a diverse product portfolio across the utility, commercial & industrial, residential, UPS and telecom sectors and deliver end-to-end ESS solutions that cater to varying customer needs.

### Application



#### Utility

Installation | Solar/Wind generation plants, substations, etc.

We contribute to ensuring the stability of power grids in the power supply system spanning from power generation to transmission and distribution, and to standardizing renewable energy power generation.



#### Commercial & Industrial (C&I)

Installation | Buildings, factories, etc.

We improve the stability of power operation and the availability of self-consumption by lowering day-time maximum loads in commercial buildings including office spaces, public institutions, schools and hospitals.



#### Residential

Installation | Detached and row houses

We ensure 24/7 supply of eco-friendly energy through alignment with photovoltaic(PV) power systems. This in turn increases residential energy self-consumption rates while reducing electric bills.



#### UPS

Installation | Factories, financial institutions, IT companies (servers), etc.

We help protect data centers from unexpected operational disruptions by ensuring reliable power quality and continuity while minimizing total power consumption and reducing facility investments.



#### Telecom

Installation | Base stations, repeaters

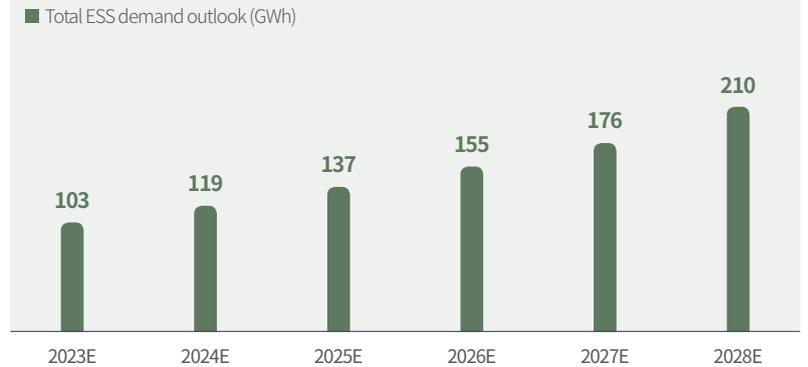
We deliver lifetime performance as well as reduced weight, smaller volume and higher energy density, and bring a dramatic reduction in maintenance expenses through the use of Li-ion batteries.



### Market Outlook

Countries around the world are increasing investments in green infrastructure to stimulate the economy slowing down amid the continued pandemic, and the Russo-Ukraine war heightened interest in energy security to accelerate the global transition to renewable energy. This resulted in sustained demand growth in ESS installations that are essential for energy supply/demand management, and the global LiB ESS market is expected to achieve a CAGR of 15%, expanding from 103 GWh in 2023 to 210 GWh in 2028. Notably, sizable market growth is expected in the US, China and Europe where large-scale, government-led green policy initiatives are being undertaken. The US signed the IRA into law to significantly increase investment support for ESS projects, and China set a national goal for ESS installation and is raising the proportion of renewable energy generation. Europe is also formulating its own plan to support renewable energy through the Green Deal Industrial Plan. Meanwhile, Korea and Taiwan are planning for government-driven initiatives to distribute utility ESSs, and these emerging markets are also expected to boost in line with expanding datacenter construction and the resulting growth in UPS demand.

#### Global LiB-ESS Demand Outlook



\* Source: Samsung SDI forecast (as of May 2023)

# Business Overview

## Small-Sized Li-ion Battery

### Business Summary

Samsung SDI engages in the development and sales of small-sized Li-ion batteries that are categorized into cylindrical and pouch forms. These batteries are expanding their application into broader areas, powering such mobile devices as smartphones, laptops, and power tools in line with the growing market needs for portability, ranging from wearables and micro mobility. On the back of our quality-first management philosophy and steadfast commitment to technology innovation, we maintain solid market dominance in the global small-sized Li-ion battery market.

### Application

Small-sized Li-ion batteries are categorized into batteries that power the three major IT devices of mobile phones, laptops and tablets as well as wireless earbuds and to batteries that supply power to power tools, e-bikes, e-scooters, electric vehicle(EV)



#### Cylindrical

Power tools, gardening tools, vacuum cleaners, e-bikes, e-scooters, electric vehicle(EV)



#### Pouch

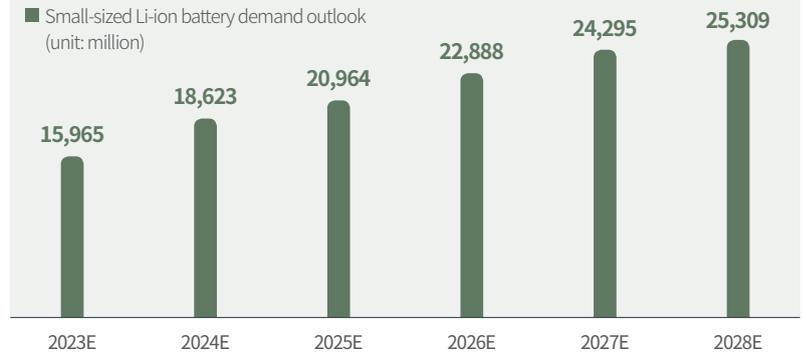
Smartphones, tablets, wearables, wireless earbuds



### Market Outlook

As the lifting of COVID-19 lockdowns and the resulting global economic downturn add to uncertainties across the market, the small-sized Li-ion battery demand for 2023 is forecast to rise by 20% year-on-year to 16 billion cells<sup>1)</sup>. While the 2022 growth was negative in the IT sector due to sluggish demand for the three primary devices of smartphones, laptops, and tablets, the total demand is set to grow continuously in line with 5G-enabled digital transformation progressing at full scale, the growth potential of IoT, metaverse, and other new market segments, and increases in demand for wireless earbuds and other wearables. In the power application market, we will witness lackluster demand for power tools that are driven by the US. Still, mobility electrification will accelerate with the policy support provided by governments worldwide. EV startups and car OEMs will boost their EV manufacturing, and demand for micro mobility including e-bikes and e-scooters will rise mainly in Europe, leading the growth of the cylindrical battery market.

### Global Small-sized Li-ion Battery Demand Outlook



1) Based on demand in our 2023 business plan  
 \* Source: Samsung SDI forecast (as of May 2023)

# Business Overview

## Electronic Materials

### Business Summary

Since the development of EMCs for the semiconductor manufacturing process in 1994, we have established our competitiveness in electronic materials business on the strength of our core technology and expert competency. Samsung SDI mainly engages in the development and sales of semiconductor and display materials. Not only do we bolster our leadership in the established market, but we also remain committed to securing our competitive advantage for such next-generation cutting-edge materials for QD, OLED, EUV lithography market.

### Application



#### Semiconductor

We produce patterning materials (SOH, SOD, and slurry) used to form semiconductor wafer patterns as well as packaging materials (EMC) that protect semiconductors and chips from the external environment.



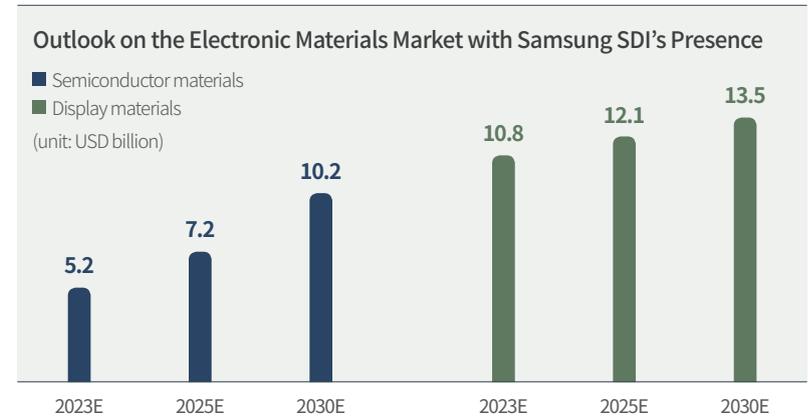
#### Display

Our electronic materials are mainly adopted for LCD, OLED and other display panels. These materials are sold in the form of films or base composite materials, and include films such as POL (polarizing film), FOCA and process materials such as OLED materials and color Photo Resist (color PR).



### Market Outlook

As the global economic growth is expected to decline amid the worldwide inflationary pressure, and international conflicts, this will dampen the market demand for electronic materials in 2023. While positive signals are observed in the semiconductor market from the long-term demand perspective in the wake of the emergence of ChatGPT, companies may find it difficult to exhaust their inventory for the time being amid the sharp drop in demand, and the related materials market won't be experiencing sizable growth. The display market is forecast to maintain its negative growth from the previous year or inch up slightly while OLED-related market growth will be solid in line with the increasing adoption of OLED for IT and TV products and the size of such products becoming ever larger.



\* Source: Samsung SDI forecast (as of May 2023)

# Business Overview

## 2022 Business Highlight

### All-Solid-State Battery



#### Completing an all-solid-state battery pilot line

In March 2023, we completed a 6,500 m<sup>2</sup>-sized all-solid-state battery pilot line at the SDI R&D Center. This facility dedicated to all-solid-state battery manufacturing will drive our efforts to secure manufacturing technology as well as producing industry-leading research outcomes for all-solid-state battery.

### Automotive Battery

Indiana, US



#### Further tapping into markets in the Americas

Samsung SDI partnered with GM (General Motors) to establish an EV battery joint venture in the US. With a goal of initiating mass-production in 2026, we will invest more than USD 3 billion to build a plant with over 30GWh in annual capacity. Following our first joint venture formed with Stellantis, this partnership will create our second battery production facility in the US to further drive our efforts to tap into the US market.

### Energy Storage System



#### Securing DC box solutions with best-in-class safety performance for the SBB

Samsung SDI secured battery DC box solutions that satisfy the most rigorous safety criteria set out in today's global standards. In so doing, we increased the installed battery capacity within the SBB (Samsung Battery Box), and integrated all devices required for operation to improve our competitiveness from the TCO perspective.

### Small-Sized Li-ion Battery



#### Expanding our cylindrical battery line in Malaysia

To cater to the recent growth in cylindrical battery demand, Samsung SDI invested KRW 1.7 trillion in expanding our cylindrical battery line in Malaysia. The 2nd plant where our PRiMX cylindrical battery will be manufactured broke ground in July 2022 and is set for completion in 2025.

### Electronic Materials



#### Leading the market with FOCA and initiating the development of inorganic photoresists

We launched competitive products on the strength of our exceptional FOCA (Foldable Optical Clear Adhesive) technology, leading the display materials market in 2022.

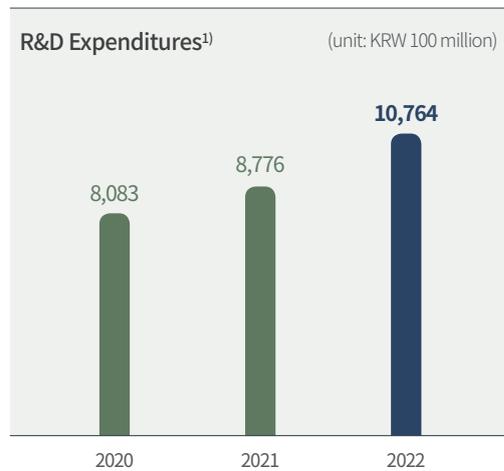
We also initiated the development of inorganic photoresists (PR) noted for its potential for sizable growth in the next-generation semiconductor market, and are currently engaging in sample evaluation.

# Business Overview

## R&D

### R&D Approach

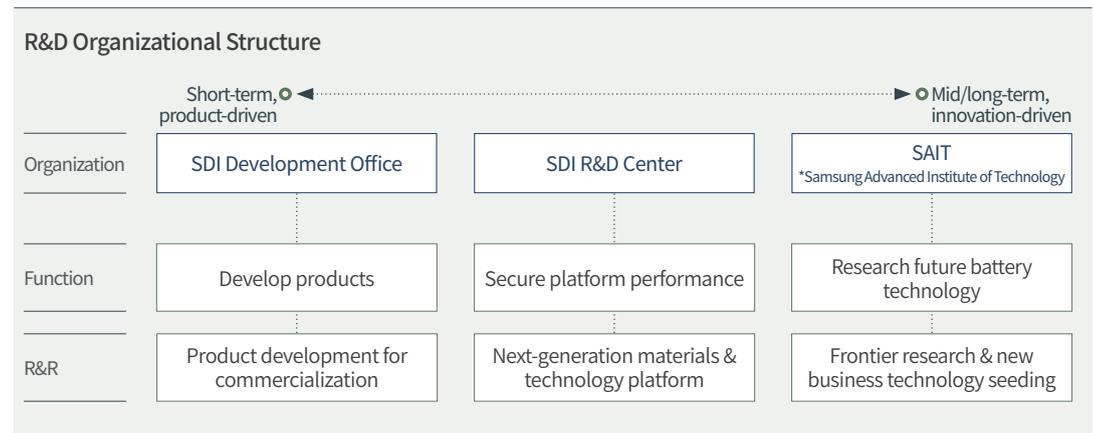
In response to the growing needs for eco-friendly and safe products, Samsung SDI is proactively engaging in R&D to build differentiated technology competitiveness. We also drive our R&D efforts to move ahead in embracing new products and technologies with a focus on battery, IT devices, and semiconductor/display electronic materials. Not only do we set the trend in the rapidly-evolving technology landscape, but we strive to secure future growth drivers. Furthermore, our R&D operations aim to bolster our expertise in researching and developing battery materials and to contribute to ESG management by further exploring recyclable materials to ensure the reliable supply of raw materials.



1) Excluding governmental subsidies, on a consolidated basis

### R&D Organizational System

Samsung SDI operates the SDI R&D Center tasked with establishing platform performance as well as R&D organizations within respective business divisions to reinforce its global technology leadership through close collaboration across business divisions. Small-Sized Li-ion and Automotive and ESS Business departments are located at the Giheung worksite to improve efficiency in battery development. The Electronic Materials Business has moved into the Samsung Future Technology Campus to generate synergy through joint material R&D endeavors. To tailor our R&D on new battery technology to different regions of the world, we opened overseas R&D centers in Munich, Germany (SDIRE, SDI R&D Europe) in July 2022, in Boston, the US (SDIRA, SDI R&D America) and in Shanghai, China (SDIRC, SDI R&D China), paving the way to strengthen our global R&D capabilities.



### Open Innovation

Our strategic industry-academia cooperation program aims to help Samsung SDI secure next-generation battery technology and nurture top-notch talent. The second such program spanning 2022 to 2026 welcomed KAIST as a new member in addition to Seoul National University, POSTECH, Hanyang University, Sungkyunkwan University, and UNIST who attended the first program. Besides, we continue to partner with domestic and overseas universities leading in battery research to set us apart from the competition in technology development while operating R&D centers in the US, Europe and China to reinforce our R&D capabilities.

# Business Overview

## Battery R&D Activities

### All-Solid-State Battery

Samsung SDI is developing all-solid-state batteries which deploy solid electrolytes in place of liquid ones normally used for conventional batteries with an aim to improve battery safety and energy density. With our success in designing and synthesizing solid electrolytes, we have led the way in technology development by manufacturing all-solid-state battery prototypes. We also developed anode-less all-solid-state battery technology with improved cycle life through the adoption of independently-configured solid electrolyte materials and lithium anodes to demonstrate best-in-industry energy density and performance.

Our 6,500m<sup>2</sup>-sized S-Line initiated its construction at the SDI R&D Center in March 2022 as our all-solid-state battery pilot line and completed in March 2023. This pilot line will enable us to start the production of small-sized sample cells and conduct performance, materials, parts, and process tests. We will secure the technology to manufacture larger cells and scale up our manufacturing towards the commercialization of all-solid-state battery.

### Cobalt-free Battery

Cobalt, a key raw material for battery production, is instrumental in ensuring battery safety and performance. Its high prices and geographical concentration, however, also gives rise to supply/demand risk. To mitigate such risk, we are exploring cobalt-less cathodes with reduced cobalt content or cobalt-free cathodes for our high-capacity battery production. Samsung SDI is developing NMX material which does not contain cobalt and still retains the strengths and basic properties of existing cathode materials to the fullest possible extent. Applying NMX that is eco-friendly and price-competitive while mitigating the risk of raw material supply/demand for battery mass-production will surely assist Samsung SDI in securing competitiveness in the EV and ESS battery markets.

### Battery Recycling

The burgeoning EV market will naturally lead to increases in the generation of end-of-life batteries, which draws our attention to minimizing the resulting environmental impact. To expand resource reclamation through battery recycling, we opened the Recycling Research Lab exclusively responsible for researching ways to recycle end-of-life batteries within our R&D Center in May 2022. Work is on-going to increase the recovery of battery materials and reclaim eco-friendly materials, and the Lab will also engage in technology cooperation with partners and in industry-academia collaborations to develop new recycling technology. This, in turn, will help us continuously raise the proportion of recycling such core battery raw materials as cobalt, nickel, and lithium.

## Patent Management

Samsung SDI leverages patents to safeguard our technology and develop market-leading products and services while managing patent-related risks that may occur in business conduct. We proactively file and register our patent applications on our proprietary technology across major countries in consideration of our markets and production locations, and prevent technology associated with trade secrets from being leaked by registering such technology as trade secret and managing them accordingly. We have remained steady with our patent registration efforts since the early days of business to establish a wide-ranging patent portfolio covering the full spectrum of rechargeable battery and electronic materials, and have put our patents to work in bringing market-leading innovative products to market. As to next-generation technology, not only do we develop our internal technology capabilities, but also partner with leading universities and research institutes in Korea and overseas to secure patents in promising future technology areas. For exceptional external patents, we increase our freedom to operate either through patent licensing or patent acquisition. Meanwhile, we minimize patent risk through rigorous verification of competitor patents in the product development process. Our patent competitiveness gained as such ensures that we continue and expand stable business relationships with our customers and suppliers. As of the end of 2022, Samsung SDI's pool of patents included 5,782 patents in Korea and 13,415 patents overseas.

### Patents Registered on a Cumulative Basis

Country	Unit	2020	2021	2022
Korea	cases	5,070	5,231	5,782
US	cases	4,022	3,976	4,107
China	cases	2,038	2,042	2,326
Japan	cases	1,410	1,336	1,435
Europe	cases	4,113	4,410	4,743
Others	cases	983	740	804
<b>Total</b>	cases	<b>17,636</b>	<b>17,735</b>	<b>19,197</b>

# Business Overview

## Advancing the smart factory initiative

Samsung SDI has consistently advanced the smart factory initiative to leverage automation systems in boosting our manufacturing competitiveness by improving our production efficiency and product quality. The Manufacturing Execution System (MES) brings dramatic improvements for large, high-speed data processing. We developed the next-generation MES optimized for EV battery production, and have rolled out this system across our entire global operations starting with new locations in 2022. We also expanded factory logistics throughout the entire process ranging from the raw material warehouse to shopfloor and the finished goods warehouse and are advancing ATS (Automated Transfer System) functionality to improve transfer efficiency. We ultimately aim for unmanned plant operations. With this goal in mind, we equipped all our locations with a system to monitor production operations in real time to automatically control equipment so that worker-induced variation in the manufacturing

process does not affect product quality. Work is also underway to render our system functionality more intelligent to detect the operational status of equipment to predict their failure and take preventive maintenance measures. Going forward, Samsung SDI is implementing our intelligent smart factory strategy to improve the accuracy and speed of equipment control and quality analyses through AI-enabled big data analytics and to leverage digital twin technology for factory logistics forecasting and production optimization simulation throughout the entire lifecycle from raw materials to finished products. In line with the addition of new overseas locations to our global network, we provide immersive job training enabled by the application of VR/AR and work to establish a real-time remote collaboration system to help our shopfloor staff with capacity building. In so doing, we aim to establish smart factories optimized for battery production and continuously boost our manufacturing competitiveness in the process.

