Toshiba Corporation

SCiB™ Long-Life Lithium Ion Rechargeable Battery

Features

SCiB™ uses lithium titanium oxide (LTO) in its anode to achieve excellent characteristics, including safety, long life, low-temperature performance, rapid charging, high input/output power and large effective capacity. SCiB™ has been widely used for vehicle, industrial and infrastructure applications, including automobiles, buses, railroad cars, elevators and large-scale power storage facilities linked to renewable energy.

Basic Concept or Summary

Six features
SCiB™ provides a long life of over 20,000*1 charge/discharge cycles, rapid charging, high Input/output power performance and excellent low-temperature operation, all while maintaining a high level of safety.

Safety:
Uses highly safe lithium titanium oxide (LTO)

Long life:
Over 20,000 cycles*1

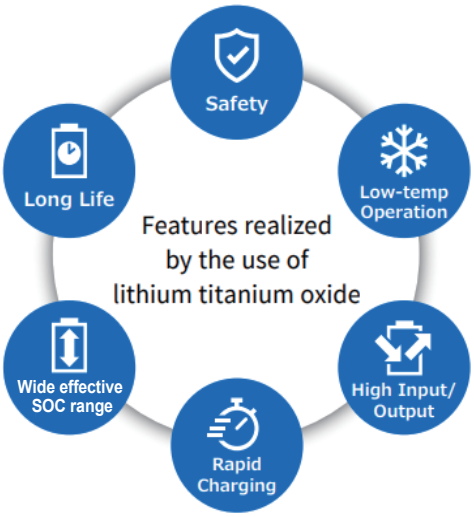
Low-temperature operation:
Can be used at temperatures as low as -30°C

Rapid charging:
Rechargeable approximately 80% of capacity in min. 6 minutes*1

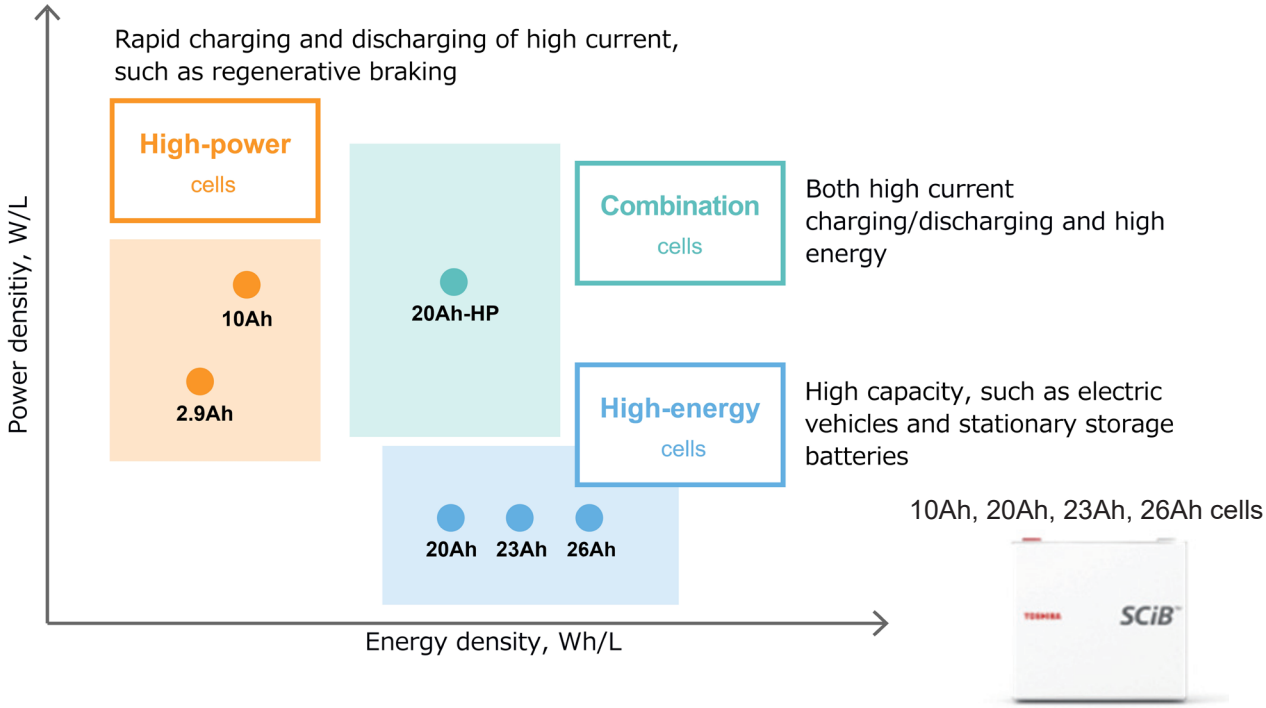
High input/output:
Chargeable at large current and provides large current output

Wide effective SOC range*2:
Provides a large available capacity

*1 Measured with a particular single cell under specific conditions
*2 SOC: State of Charge

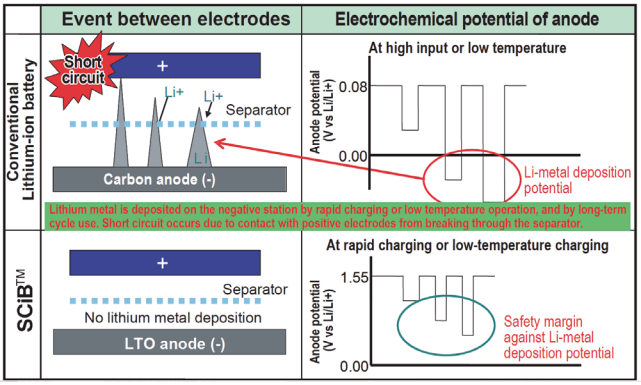


Characteristics
SCiB™ rechargeable cells can be categorized into three types: power type, high energy type, and combination type.



The SCiB™ rechargeable battery does not explode or ignite easily even when short-circuited, and lithium metal deposition is extremely unlikely to occur even under high input, low temperature, and long-term cycle use.

Materials/ technology	SCiB™	Conventional Lithium-ion battery
Anode material	Lithium Titanate Oxide (LTO, noncombustible materials) → thermally stable	Carbon materials
Internal short-circuit current	Small → Obtained higher resistivity due to phase transformation of the LTO surface where the short circuit occurred	Large
Lithium metal deposition	No → Does not reach deposition potential for lithium even at high input, low temperature, and long cycle stages	Yes



Effects or Remarks

- This enables efficient recovery/reuse of regenerative energy, allowing effective utilization of limited energy.
- With its improved cycle life, reduced maintenance frequency, reduced waste requiring disposal, and lower running costs, the SCiB™ rechargeable battery can help reduce environment impact. It was also certified as Toshiba's "Excellent ECP*3" (given to Toshiba products with excellent environmental features).

*3 Environmental Conscious Products

Installation in Practice or Schedule

Domestic Installation at automobile manufacturers
- Suzuki Motor Corporation "eNe-CHARGE (vehicle's regenerative braking system)"
- Nissan Motor Co., Ltd. "DAYZ/ DAYZ Highway STAR" (2019*4)
- Mitsubishi Motors Corporation "eK wagon" (2019*4)
- Mazda Motor Corporation "MAZDA 3"s mild hybrid system "M Hybrid" (2019*4)
- Hino Motors, Ltd. "Hino Profia Hybrid" (2019*4)

Other installation record
- Tohoku Electric Power Company "Verification Project for Storage Battery System to Deal With Frequency Fluctuation at Nishi Sendai Substation" 40 MW output storage battery system (2013*4)
  Storage battery system and micro EV battery (2014*4)
- Tohoku Electric Power Company "Verification Project for Minami Soma Substation Supply and Demand Balance Improvement Storage Battery System"
  400 MW output storage battery system (2015*4)

Overseas
- Indiana State, USA "Plug-in Ecosystem Verification Experiment Project"
  Storage battery system (2013*4)
- Madrid Province, Spain: Projects for "Development of Safe Low-Cost Large-Scale Storage Battery System Technology" and "Development of Series Stabilization Low-Cost High-Output Storage Battery System Technology", Mobile storage battery system (2015*4)

*4 Year of press release

Please refer to our website for the latest implementation results.

Contact: **Toshiba Corporation**
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URL: https://www.global.toshiba/ww/products-solutions/battery/scib.html