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Global Superconductors Market – Materials, Products and Applications

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Abstracts

Global Superconductors Market Trends and Outlook

Superconductors are materials that can conduct electricity without resistance when cooled below a certain critical temperature. This means that once an electric current starts flowing through a superconductor, it can continue indefinitely without losing energy as heat. Superconductors with a critical temperature below 40K (-233.15°C) are called low-temperature superconductors (LTS), those above 40K (-233.15°C) are called high-temperature superconductors (HTS), and those with a critical temperature about 300K (26.85°C) are called room-temperature superconductors. The superconductors market figures presented in this study refers to the annual sales generated by manufacturers of superconducting materials and products/systems. Services and maintenance revenue is not included in the market.

The global market for superconductors was valued at US$7.8 billion in 2023. Forecast to be US$8.5 billion in 2024, the global superconductors market size is projected to reach above US$16 billion by 2030, growing at a CAGR of 11.2% between 2024 and 2030. This growth in superconductors market is mainly attributed to demand from new emerging applications in power & energy and absolute value growth in medical applications.

While demand for low-temperature superconductors (LTS) is continued to progress at high single digit rates driven by continued demand from established markets such as medical and scientific research & technology development, demand for high-temperature superconductors (HTS) is anticipated to advance at a faster pace during the forecast period. HTS tapes are already in demand for power grids (used in cables, transformers, and other components) and equipment like NMR spectrometers and MRI

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machines. If nuclear fusion reactors become a reality, they will require large amounts of HTS tape - stretching thousands of kilometers - to handle extremely high current densities. The historically limited production and high cost of high-temperature superconductors have been major barriers, but this is now changing as companies such as MetOx International and Faraday Factory Japan has now developed cost-effective methods to mass-produce HTS tapes with capacities close to 100 thousand kilometers per year.

Major companies operating in the global superconductors market include American Superconductor Corporation (AMSC), ASG Superconductors Spa, Bruker Corporation, CAN Superconductors s.r.o., Cryomagnetics Inc., Faraday Factory Japan LLC, Fujikura Ltd., Hitachi Ltd, SuperPower Inc. (Furukawa Electric), Japan Superconductor Technology Inc., Luvata Oy (Mitsubishi Materials), Shanghai Superconductor Technology Co., Ltd., Siemens AG, Sumitomo Electric Industries Ltd., SuNAM Co., Ltd., SuperOx, THEVA Dunnschichttechnik GmbH, and Western Superconducting Materials Technology Co., Ltd., among others.

Superconductors Regional Market Analysis

The global Superconductors market has been, for the purpose of this report, categorized into four major regions, namely North America, Europe, Asia-Pacific and Rest of World. These regional markets further analyzed for 12 independent countries across North America - The United States and Canada; Europe - France, Germany, Italy, Russia, Spain and the United Kingdom; and Asia-Pacific - China, India, Japan and South Korea.

Superconductors market is well developed in countries with advanced industrial, healthcare, and research infrastructures, where applications such as MRI systems, fusion research, and electrical equipment for power grids are in high demand. The U.S. leads in the application of superconductors, particularly in medical technologies and high-energy physics research. The U.S. accounts for a substantial share of the MRI market, where superconducting magnets are crucial, and is investing heavily in quantum computing and energy applications. Market share in the global superconductors market for North America (the U.S. and Canada) is around 35.4% in 2024, followed by Asia-Pacific and Europe.

In Europe, Germany, France, Italy, and the UK are the dominant players, while in Asia, China and Japan are at the forefront. China, in particular, has been expanding its capacity for both superconducting materials and applications in technology. South

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Korea is also emerging as a key player with a strong focus on advancing its electronics and energy industries using superconducting materials. Asia-Pacific, driven by robust growth in China and Japan, is anticipated to post the fastest CAGR of 13.5% between 2024 and 2030 reaching US$6.3 billion by 2030.

Global Superconductors Market Analysis by Material Type

Based on material type, the Superconductors market is segmented into Low-Temperature Superconductors and High-Temperature Superconductors. Low-temperature superconducting materials have been in a dominant position in the global superconductors market, occupying a share of 83% in 2024, due to their excellent machining performance and cost advantages. They are widely used in medical equipment and large-scale scientific research projects. For example, in the medical field, it is mainly used in magnetic resonance imaging (MRI) machines; in scientific research, it is used in large proton colliders (such as LHC) and controlled nuclear fusion (such as ITER). In the forecast period, low-temperature superconducting materials will still be the main pillar materials of the superconducting industry and projected to occupy a share of 60.5% in 2030.

On the other hand, the demand for high-temperature superconductors is expected to record a robust CAGR of 28% between 2024 and 2030, reaching US$6.4 billion in 2030. This growth will be largely attributed to projected high demand from electrical equipment (such as cables, current limiters, transformers, generators, motors, and superconducting magnetic energy storage (SMES) systems) used in power transmission and storage, and energy sectors.

High-temperature superconducting (HTS) tapes are increasingly used in power grids for cables, transformers, and other components, as well as in equipment like NMR spectrometers and MRI machines, with demand steadily rising. Furthermore, if nuclear fusion reactors become commercially viable, they will require vast quantities of HTS tape, spanning thousands of kilometers, to manage the exceptionally high current densities involved. According to the 2024 report by Fusion Industry Association, over 71% of fusion companies anticipate starting to deliver power to the grid before 2035. To make this happen, Fusion Industry Association projects multiple prototypes of fusion machines must be built, and the fusion industry would consume approximately 300,000 km of high-temperature superconductors, prompting scale-up of high-temperature superconductors production.

Global Superconductors Market Analysis by Product Type

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The global Superconductors market is segmented based on product/device type into Superconducting Magnets, Superconducting Cables, Other Electrical Equipment (fault current limiters, transformers, generators, motors, degaussing systems and superconducting magnetic energy storage (SMES) systems etc.), Electronics & Others (superconducting quantum interference devices (SQUIDs), sensors and detectors, superconducting quantum processors, superconducting integrated circuit etc.).

Superconducting magnets, mainly used in scientific research & technology development and medical applications, dominate the market for Superconductors worldwide, accounting for a share of 81% of the total market in 2024. However, with advancements in superconducting electrical equipment (such as transformers, generators, motors, current limiters, and power storage systems) and superconducting cables, the demand for these products is projected to record significant growth with CAGRs of 26.6% and 24.3% respectively during 2024-2030 period, capturing a combined share of 32.4% of the total superconductors market in 2030.

Global Superconductors Market Analysis by Application

The market for global Superconductors applications analyzed in this report include Medical Applications, Scientific Research & Technology Development, Power & Energy, Transportation, Industrial Applications, and Other Applications such as quantum computing, communications, military/defense etc.

Superconductors are widely used in medical applications (such as MRI machines and NMR systems), for which the market value is estimated at US$5.5 billion (64.4% share) in 2024 and further anticipated to post a 2024-2030 CAGR of 7.5%. However, demand for superconductors in power & energy applications is anticipated to post the fastest CAGR of 23.5% during 2024-2030 period reaching US$3.6 billion by 2030 from US$1 billion in 2024. In power & energy sector, superconductors are used in superconducting magnetic energy storage systems (SMES) and fault current limiters for stabilizing power grids, in superconducting cables for upgrading power grids to handle growing demand and lossless power transmission over long distances.

Superconductors Market Report Scope

This global report on Superconductors analyzes the market based on material type, product/device type and application. In addition to providing profiles of major companies operating in this space, the latest corporate and industrial developments have been

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covered to offer a clear panorama of how and where the market is progressing.

Key Metrics

Historical Period: 2021-2023

Base Year: 2023

Forecast Period: 2024-2030

Units: Value market in US$

Companies Mentioned: 45+

Global Superconductors Market by Geographic Region

- North America (The United States and Canada)
- Europe (France, Germany, Italy, Russia, Spain, The United Kingdom and Rest of Europe)
- Asia-Pacific (China, India, Japan, South Korea and Rest of Asia-Pacific)
- Rest of World

Global Superconductors Market by Material Type

- Low-Temperature Superconductors (LTS) – Niobium Titanium (NbTi) and Niobium Tin (Nb3Sn)
- High-Temperature superconductors (HTS) – BSCCO conductors incorporating Bismuth and cuprates (Bi2Sr2Ca1Cu2OX or B2iSr2Ca2Cu3OX), REBCO conductors (Rare-Earth1Ba2Cu3OX), MgB2 (Magnesium Diboride)

Global Superconductors Market by Product Type

- Superconducting Magnets

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Superconducting Cables

Other Electrical Equipment (fault current limiters, transformers, generators, motors, degaussing systems and superconducting magnetic energy storage (SMES) systems etc.)

Electronics & Others (superconducting quantum interference devices (SQUIDs), sensors and detectors, superconducting quantum processors, superconducting integrated circuit etc.)

Global Superconductors Market by Application

Medical Applications (Magnetic Resonance Imaging MRI, Nuclear Magnetic Resonance NMR, proton beam therapy, SQUIDs for detecting magnetic fields in the brain and heart etc.)

Scientific Research & Technology Development (high energy physics, fusion energy development, particle accelerators)

Power & Energy (power transmission, energy storage, wind turbines etc.)

Transportation (levitating (maglev) trains, marine, frictionless bearings etc.)

Industrial (magnetic separators, induction heaters, generators etc.)

Other Applications (quantum computing, communications, military/defense etc.)

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ASG Superconductors Spa
Bilfinger Nuclear & Energy Transition GmbH
Brookhaven Technology Group
Bruker Corporation
CAN Superconductors s.r.o.
Cryomagnetics Inc.
Cutting Edge Superconductors, Inc.
Epoch Wires, Ltd.
Faraday Factory Japan LLC

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Fuji Electric Co.
Fujikura Ltd.
Furukawa Electric Co. Ltd. / SuperPower Inc.
General Electric Co.
High Temperature Superconductors Inc.
Hitachi Ltd
HTS-110 Limited Partnership
Hyper Tech Research, Inc.
Innova Superconductor Technology Co., Ltd. (InnoST)
Japan Superconductor Technology Inc.
Kawasaki Heavy Industries Ltd.
LS Cable & System Ltd.
Luvata Oy
MetOx International, Inc.
Mitsubishi Electric Corporation
New England Wire Technologies
Nexans S.A.
Oxford Instruments plc
QDM (Quantum Designed Materials) Tech Ltd.
Quantum Design Inc.
Sam Dong Co, Ltd.
Shanghai Creative Superconductor Technologies Co., Ltd. (SCSC)
Shanghai Superconductor Technology Co., Ltd.
Siemens AG
Solid Material Solutions, LLC
SUBRA A/S
Sumitomo Electric Industries Ltd.
Sumitomo Heavy Industries Ltd
SUNAM CO., LTD
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