

Thermo-Electric Semiconductor Market - Forecasts from 2021 to 2026

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Abstracts

The thermo-electric semiconductor market is expected to grow at a compound annual growth rate of 9.18% over the forecast period to reach a market size of US\$1,238.670 million in 2026 from US\$731.303 million in 2020. Thermoelectric semiconductor is the solid semi-conducting equipment that converts temperature to heat transmitted to DC power. The semiconductors are widely used in cooling devices and generators. The generator and cooling refrigerators undertake a seebeck effect to generate voltage and undertake electricity or load for further transferring the energy to the other sources or using it up in the cooling process. The semiconductor is made of combination of thermoelements which have thermo-couple having P and N type of Conductor adjoined with metal strip that connects in series in the circuit boards. This triggers the seebeck effect which is direct conversion of heat to voltage. The material used for thermo-electric semiconductors are mainly bismuth telluride, lead telluride, and silicon germanium. The demand for the thermo-electric semiconductors can be associated with increase in the rate of nano-engineering projects to miniaturize the devices to make it portable and space efficient. The thermo-electric semiconductors demand is also expected to grow with advancement in the refrigeration and cooling space.

The thermo-electric market is segmented into by type as Nano, Heavy and others. The thermo-electric semi-conductor is primarily offered in either Generator or Cooling machines. Though, the applications of thermo-electric semi-conductors are prevailing in almost all industry verticals such as Consumer Electronics, Telecommunications, Automotive, Medical Industry, Mining, Power Generation, Refrigeration and others. Under the COVID-19 pandemic, in lockdown, the market growth has been severely impacted by the recent outbreak since the disruption in the supply chain led to a delay in the order shipments faced by the conducting manufacturers. Also, the non-availability of raw materials and non-availability of technical further led to a slump in the

manufacturing output as well. However, the demand for the thermo-electric semi-conductor has remained stable as it is required in renewable energy industry sector. The demand for the thermo-electric semi-conductors also remained in momentum as the sale of oximeters, thermometers and other medical devices remained in trend. The use of thermo-electric semi-conductors is also being made in advanced healthcare machinery such as X-ray scanners, CT scanners and other specialty equipment. With the increasing demand for the thermo-electric equipment given its unique features have increased its adoption around the industry verticals. For instance, LG Innotech has undertaken large scale production of thermo-electric semi-conductor for its wine cooling Mini Cellar. The cellar is innovative productive for the wine consuming population as it offers ambient cooling, with no noise and without altering the wine taste and other characteristics. The semi-conductors are developed out of nano-polycrystalline materials on which the firm has taken patent and is flexible to be used on ships, waste heat power generation units, and other autonomous vehicles.

Innovation in the Automobile Sector

The automobile firms are looking forward to manufacture the vehicles driven by solar energy. Such development is expected to increase the demand for thermo-electric semi-conductor materials as it readily converts heat into voltage format. Several automobile companies are undertaking usage of thermo-electric semi-conductor in vehicles. For instance, In the United States, companies such as Volvo, Ford, BMW are under-development of thermoelectric waste heat recovery that saves that cost by propelling vehicle based on the energy produced through semi-conducting units. As per the data by Massachusetts Institute of Technology (MIT), There are projects undertaken by BSST, a thermoelectric device maker and BMW autonomously with new thermo-electric semi-conducting materials Bismuth telluride, hafnium and zirconium which aims to improve the efficiency of the automobile by 40%. The advancement is aimed at recovering energy emitted from car's exhaust system into electricity to save upon fuel. Similarly, GM is also undertaking the development of thermo-electric semi-conducted energy recovery system based on material called skutterudites, the material is relatively cheaper than that of Bismuth used by BMW and BSST with better ability to perform in high temperature zones. The GM has experimented its utility in Chevrolet which resulted in generating 350 watts of power, and improving fuel economy by 3%. Though, the company faced limitations in developing the similar technique with alternative materials. The firm expressed incompatibility with thermal-electric semi-conducting units, time consuming process, managing heating of conducting units, expensive in terms of cost per device and cost per watt. The materials used are rare and scarce. If the alternative resource technology is not developed, the it could limit the growth of thermo-

electric conductors.

Growing demand for Chlorofluorocarbons (CFC) less refrigeration unit for small vending kiosks

With the increase of consumer electronics such as refrigerators, kitchen coolers and heating devices, the demand for the thermo-semi-conductors also increases. The consumer durables and commercial cooling companies are using thermo-electric semi-conductors in the refrigerating or heating devices because it is making the internal engineering wiring outlay compact in size, enables portability of the devices, and also makes the high-power consumption products efficient. The consumer preferences have been dynamic in terms of specifications as they now look for space efficient, lower maintenance and operational costs, CFC fewer emitting devices, no compression noise. The trend of thermo-electric semi-conductors will be on rise with increase in the development of Internet of Things (IOT) based technology. For instance, Phononic founded in North Carolina, 2009, have compact freezer and fridge based on thermo-electric semi-conductor technology. The products are for portable and thus suitable for travelling, transporting and storing vaccines at the medical and small dispensaries centers. Unilever, Thermo Fisher Scientific offers competitive thermo-electric semi-conductor cooling products used by Pepsi, Unilever small vending outlets. Furthermore, Precision Hawk suggests that thermo-electric technology can also be used on drones to supply medicines and vaccines.

Regional Analysis

Asia-Pacific nations have demand for the thermo-electric semi-Conductors which can be attributed to demand for sustainable power-generating devices. The change in consumer preference towards green energy is expected to drive demand North America. The Automotive, Medical industry applications also contribute to the demand. Overall, China, USA stands at the top three leading the thermo-electric semi-Conductor market followed by South Korea, Germany and Japan. China holds significant share in mass manufacturing semi-Conductor circuit boards and thermo elements with least cost achieving economies of scale whereas Japan, and USA has resources for research and development of cutting-edge nano technologies. Countries such as India has great resource of engineering scholars and research institutions as Indian Institute of Technology and cost-effective manufacturing facilities giving best alternatives to investors against China. China has taken brunt over the semi-Conductors, electronics and engineering trade due to series of US-China trade war and conspiracies based on initiating covid-19 leading to boycott of Chinese origin, which has benefitted countries

such as India, Vietnam, South Korea, Japan, and Germany.

Segmentation

By Type

Heavy

Nano

Thin-Film

By Offering

Coolers

Generators

Others

By Applications

Consumer Electronics

Telecommunications

Automotive

Mining and Power Generation

Others

By Geography

Americas

USA

Canada

Others

Europe Middle East and Africa

Germany

Spain

United Kingdom

France

Others

Asia Pacific

China

Japan

South Korea

India

Others

Note: The report will be delivered within 3 business days.

Contents

1. INTRODUCTION

- 1.1. Market Definition
- 1.2. Market Segmentation

2. RESEARCH METHODOLOGY

- 2.1. Research Data
- 2.2. Assumptions

3. EXECUTIVE SUMMARY

- 3.1. Research Highlights

4. MARKET DYNAMICS

- 4.1. Market Drivers
- 4.2. Market Restraints
- 4.3. Porters Five Forces Analysis
 - 4.3.1. Bargaining Power of Suppliers
 - 4.3.2. Bargaining Power of Buyers
 - 4.3.3. Threat of New Entrants
 - 4.3.4. Threat of Substitutes
 - 4.3.5. Competitive Rivalry in the Industry
- 4.4. Industry Value Chain Analysis

5. THERMO-ELECTRIC SEMI-CONDUCTOR MARKET ANALYSIS, BY TYPE

- 5.1. Introduction
- 5.2. Heavy
- 5.3. Nano
- 5.4. Thermal

6. THERMO-ELECTRIC SEMI-CONDUCTOR MARKET ANALYSIS, BY OFFERINGS

- 6.1. Introduction
- 6.2. Coolers

6.3. Generators

6.4. Others

7. THERMO-ELECTRIC SEMI-CONDUCTOR MARKET ANALYSIS, BY APPLICATIONS

7.1. Introduction

7.2. Consumer Electronics

7.3. Telecommunications

7.4. Automotive

7.5. Mining and Power Generation

7.6. Others

8. THERMO-ELECTRIC SEMI-CONDUCTOR MARKET ANALYSIS, BY GEOGRAPHY

8.1. Introduction

8.2. Americas

8.2.1. Americas Thermo-Electric Semiconductor Market, By Type

8.2.2. Americas Thermo-Electric Semiconductor Market, By Offering

8.2.3. Americas Thermo-Electric Semiconductor Market, By Applications

8.2.4. By Country

8.2.4.1. United States

8.2.4.2. Canada

8.2.4.3. Mexico

8.3. Europe

8.3.1. Europe Middle East and Africa Thermo-Electric Semiconductor Market, By Type

8.3.2. Europe Middle East and Africa Thermo-Electric Semiconductor Market, By Offering

8.3.3. Europe Middle East and Africa Thermo-Electric Semiconductor Market, By Applications

8.3.4. By Country

8.3.4.1. Germany

8.3.4.2. Spain

8.3.4.3. United Kingdom

8.3.4.4. France

8.3.4.5. Others

8.4. Asia Pacific

8.4.1. Asia Pacific Thermo-Electric Semiconductor Market, By Type

8.4.2. Asia Pacific Thermo-Electric Semiconductor Market, By Offering

8.4.3. Asia Pacific Thermo-Electric Semiconductor Market, By Applications

8.4.4. By Country

8.4.4.1. China

8.4.4.2. Japan

8.4.4.3. South Korea

8.4.4.4. India

8.4.4.5. Others

9. COMPETITIVE ENVIRONMENT AND ANALYSIS

9.1. Major Players and Strategy Analysis

9.2. Emerging Players and Market Lucrativeness

9.3. Mergers, Acquisitions, Agreements, and Collaborations

9.4. Vendor Competitiveness Matrix

10. COMPANY PROFILES

10.1. Ferrotec Global

10.2. Everredtronics

10.3. Nippon India

10.4. Crystal Therm

10.5. LG Innotech

10.6. KELK Ltd.,

10.7. Jiangxi Corp.,

10.8. TEC Microsystems

10.9. Marlow II-IV

10.10. Toshiba Materials

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