

Bioceramics and Piezoceramics Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 Segmented By Material (Bio-Inert Ceramics, Bio-Active Ceramics, Bio-Resorbable Ceramics, Piezoceramics, Others), By Application (Dental Implants, Orthopedic Implants, Surgical Instruments, Implantable Electronic Devices, Diagnostic Instruments, Others), By Region and Competition

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Abstracts

Global Bioceramics and Piezoceramics Market has valued at USD17.43 billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 4.73% through 2028. The global bioceramics and piezoceramics market is experiencing a remarkable surge in growth, primarily fueled by the escalating demand from the healthcare industry. This upward trajectory can be attributed to several factors, including the expanding geriatric population, remarkable advancements in technology, and the rising prevalence of chronic diseases across the globe.

Bioceramics and piezoceramics, as ceramic materials specifically tailored for medical and dental applications, exhibit exceptional biocompatibility, and possess a unique property of changing shape when subjected to an electric voltage. These remarkable characteristics make them highly suitable for a wide range of applications, including orthopedic implants, dental procedures, and diagnostic and therapeutic equipment, further contributing to the market's growth.

Witnessing a significant share, the Asia Pacific region stands out as a key player in the



global market, driven by the implementation of numerous healthcare policies and the continuous development of the healthcare sector. As the demand for advanced healthcare solutions continues to rise on a global scale, the demand for bioceramics and piezoceramics is expected to follow suit, propelling the market's growth in the foreseeable future.

In conclusion, the global bioceramics and piezoceramics market is currently on a robust growth trajectory, primarily driven by the increasing demand within the healthcare industry. With ongoing technological advancements and the continual growth of the geriatric population, this upward trend is expected to persist, driving the market forward in the coming years and paving the way for further innovation and development in the field.

Key Market Drivers

Growing Demand of Bioceramics and Piezoceramics from Healthcare Industry

Bioceramics are specialized ceramic materials designed specifically for medical and dental applications. These materials, including alumina, zirconia, calcium phosphate, glass-ceramics, and bioactive glass, possess remarkable biocompatibility and can effectively replace hard tissues in the body, such as bone and teeth.

On the other hand, piezoceramics exhibit a unique property of changing shape when subjected to an electric voltage, making them highly suitable for use in a wide range of electronic devices. Within the healthcare industry, these materials find application in ultrasound machines and other diagnostic and therapeutic equipment.

As the global population continues to age, there is an increasing demand for orthopedic and dental implants. Bioceramics, with their biocompatible nature and resemblance to natural bone, emerge as an excellent choice for such implants.

Furthermore, advancements in technology have paved the way for the development of more efficient and versatile bioceramic and piezoceramic materials, expanding their potential applications within the healthcare sector.

Moreover, the growing prevalence of chronic diseases like osteoporosis and arthritis has contributed to the rising demand for bioceramics in orthopedic surgeries.

Additionally, the unique properties of piezoceramics make them ideal for use in diverse diagnostic and therapeutic equipment, which drives up their demand within the



healthcare industry.

In conclusion, the escalating demand for bioceramics and piezoceramics in the healthcare sector acts as a significant driver for the global bioceramics and piezoceramics market. With an increasing geriatric population, continuous technological advancements, and a rising prevalence of chronic diseases, this demand is expected to witness steady growth in the coming years.

Growing Demand of Bioceramics and Piezoceramics from Electronic Industry

The electronic industry's demand for these materials is driven by the need for more efficient and reliable components in devices. Bioceramics and piezoceramics, renowned for their excellent dielectric, piezoelectric, and magnetic properties, are highly sought after for their versatile applications in capacitors, transducers, actuators, sensors, and a wide range of other electronic components. The utilization of these materials not only enhances performance of electronic devices but also contributes the performance of electronic devices but also contributes significantly to the development of advanced electronic solutions, revolutionizing various industries.

In the rapidly growing Asia-Pacific region, a global hub for electronics manufacturing, the demand for bioceramics and piezoceramics has reached new heights. This surge in demand can be attributed to the region's comprehensive electronics industry, bolstered by favorable government policies that support market growth. With its strong presence and advancements in technology, the Asia-Pacific region continues to dominate the bioceramics and piezoceramics market, catering to the evolving needs of industries worldwide.

In conclusion, the increasing demand for bioceramics and piezoceramics from the electronics industry is a significant driving force behind the global market's growth. As technological advancements continue to unfold and the need for high-performance electronic devices escalates, the demand for these materials is expected to surge even further, propelling the market's growth in the coming years. The continuous innovation and integration of bioceramics and piezoceramics into electronic systems will undoubtedly shape the future of the industry, unlocking new possibilities and revolutionizing the way we interact with electronic devices.

Key Market Challenges

Complexities Related with Biocompatibility and Long-Term Safety



Bioceramics and piezoceramics have gained widespread usage in various medical applications due to their exceptional biocompatibility. These materials possess remarkable properties such as being non-toxic, non-inflammatory, non-allergic, and non-carcinogenic, making them highly suitable for bone tissue applications. However, despite these numerous advantages, ensuring consistent biocompatibility remains an intricate challenge that necessitates careful consideration.

The interaction between these biomaterials and the human body is a critical aspect that demands thorough examination. After defining the concepts of biomaterial and biocompatibility, it becomes crucial to delve into other key aspects of the material-host interaction, such as bioactivity. Any potential adverse reactions resulting from this interaction can lead to severe complications, posing a significant risk to patient safety.

While the demand for advanced medical implants and devices continues to drive the growth of the nanostructured bioceramics market, concerns about the long-term safety of these materials persist. It is worth noting that these ceramics are often implanted into the human body, remaining there for the lifetime of the patient. Therefore, gaining a comprehensive understanding of the potential long-term effects of these materials on human health is of utmost importance.

One of the critical concerns in this field is the stability of these materials when stored for an extended period. For instance, composites that incorporate extracellular matrix proteins may not exhibit high stability during long-term storage. Overcoming this disadvantage requires further research and development efforts to ensure the maintenance of material integrity and functionality.

Moreover, the long-lasting and selectively-active nature of biomaterials has the potential to address various healthcare challenges. However, guaranteeing this longevity without compromising safety remains a complex and multifaceted issue that demands more indepth exploration and understanding. By investing in comprehensive research and continuous advancements, we can unlock the full potential of these remarkable materials while ensuring the utmost safety for patients and healthcare practitioners alike.

High Cost of Production

Bioceramics and piezoceramics are highly specialized materials, renowned for their exceptional properties that render them ideal for a wide range of applications,



particularly in the ever-evolving healthcare sector. However, the production of these ceramics entails intricate and costly processes, necessitating careful consideration.

The manufacturing process of bioceramics and piezoceramics involves a series of meticulous steps, beginning with purification to eliminate impurities and enhance the material's quality. Following purification, calcination is performed to achieve the desired chemical composition and crystal structure. Subsequently, grinding is carried out to refine the ceramic particles, ensuring optimal homogeneity and smoothness. The next step involves pressing the ceramic powder to shape it into the desired form, such as discs, rods, or complex geometries. Finally, high-temperature sintering is conducted to impart the necessary strength and durability to the ceramics.

These manufacturing steps demand significant energy consumption and necessitate the usage of sophisticated and expensive equipment. Consequently, the production costs associated with bioceramics and piezoceramics can be notably high. Furthermore, the raw materials employed in the production process, including alumina, zirconia, hydroxyapatite, and various rare elements, are themselves quite expensive, further escalating the overall production costs.

The elevated production costs directly influence the pricing of the final products, rendering them less affordable for end-users, particularly in developing countries. This affordability gap has the potential to impede the growth of the market, as the high costs may limit the accessibility and adoption rate of these remarkable materials.

Moreover, the high cost of production also creates formidable barriers to entry for new players in the market. This, in turn, leads to reduced competition and may hinder the development of innovative and cost-effective solutions, thereby impacting the overall growth of the bioceramics and piezoceramics market.

Key Market Trends

Growing Advancements in Material Design

Bioceramics and piezoceramics are ceramic materials with unique properties that make them highly suitable for a wide range of applications, particularly in the healthcare sector. Recent advancements in material design have further enhanced these properties, resulting in improved performance, and expanded applications.

For instance, the introduction of new manufacturing techniques has allowed for the



production of bioceramics and piezoceramics with precise shapes and sizes. This level of precision enables better fit and function in applications such as dental and orthopedic implants. Moreover, the field of nanotechnology has played a significant role in the development of nanostructured bioceramics. These nanostructured materials exhibit superior mechanical strength and bioactivity compared to their traditional counterparts.

The increasing advancements in material design have significantly broadened the application range of bioceramics and piezoceramics, leading to a growing demand in various sectors. In the healthcare industry, these materials are increasingly utilized in dental and orthopedic implants due to their enhanced bioactivity and biocompatibility. Furthermore, the improved material properties have also paved the way for the integration of these ceramics in electronic devices. Advanced piezoceramics, for example, are extensively used in a wide array of applications such as sensors, actuators, and transducers due to their improved piezoelectric properties.

The continuous evolution of technology and material design has attracted new players to the bioceramics and piezoceramics market, fostering healthy competition and driving innovation. This trend is expected to persist in the future, further propelling market growth.

In conclusion, the ongoing advancements in material design represent a significant trend in the global bioceramics and piezoceramics market. These advancements have not only improved the properties of these materials but have also expanded their applications, attracting new participants to the market. As technology continues to evolve, we anticipate further advancements in material design, which will undoubtedly fuel the growth of the bioceramics and piezoceramics market in the coming years.

Segmental Insights

Material Insights

Based on the category of material, the bio-inert ceramics segment emerged as the dominant player in the global market for bioceramics and piezoceramics in 2022. These ceramics exhibit exceptional resistance to corrosion and wear, making them highly durable and long-lasting. Additionally, their biocompatibility ensures that they do not provoke any inflammatory reactions when implanted in the human body, making them ideal for medical applications. By providing a stable and robust platform for tissue growth and repair, these ceramics contribute to the successful integration of implants, promoting healing and enhancing patient outcomes.



Application Insights

The orthopedic implants segment is projected to experience rapid growth during the forecast period. In the medical and healthcare sector, bioceramics and piezoceramics, known for their exceptional bonding properties, are widely utilized as implants in orthopedic surgeries. These advanced materials have revolutionized the field, providing strong and durable solutions for patients in need.

As the global population ages and the prevalence of acute and chronic trauma cases continues to rise, the demand for orthopedic surgeries has witnessed a significant surge. According to a recent report published by the America Academy of Orthopedic Surgeons, the number of orthopedic surgeries in 2021 increased by a remarkable 18.3% compared to the previous year.

Moreover, data from the Organization for Economic Co-operation and Development reveals that in 2019, Germany alone witnessed a 3.2% increase in the number of hip replacement surgeries, reaching a staggering figure of 244,590. These statistics highlight the growing need for effective and long-lasting solutions in the orthopedic field.

Given the rising trend in orthopedic surgeries, it is anticipated that the demand and utilization of bioceramics and piezoceramics for implant applications will continue to grow, fostering market expansion in the medical and healthcare sector. The remarkable properties of these materials, combined with their compatibility and effectiveness, make them a promising choice to meet the evolving needs of patients and surgeons alike.

Regional Insights

Asia Pacific emerged as the dominant player in the global bioceramics and piezoceramics Market in 2022, holding the largest market share in terms of value. The Asia-Pacific region is currently experiencing a notable rise in orthopedic surgeries and automotive production, creating a significant demand for Bioceramics and Piezoceramics used in implant, sensor, and actuator applications. This surge in demand can be attributed to various factors.

According to the International Organization of Motor Vehicle Manufacturers, automotive production in China witnessed a 3% increase in 2021, while India's production soared by an impressive 30%. Additionally, data from the Organization for Economic Cooperation and Development reveals a 5% growth in the number of hip replacement



surgeries in Australia, reaching 43,375 in 2019 compared to the 2013 figures.

With the automotive industry and orthopedic surgeries on the rise, the demand for Bioceramics and Piezoceramics in the Asia-Pacific region is expected to grow significantly, positively impacting the overall growth of the Bioceramics and Piezoceramics Market during the forecast period. This trend signifies the increasing need for advanced materials that can cater to the growing requirements of the automotive and medical sectors in the region.

Key Market Players
Ceramtec GmbH
Coorstek Inc.
DePuy Synthes Inc
H.C. Starck GmbH
Kyocera Corporation
Morgan Advanced Materials PLC
NGK Spark Plug Co., Ltd.
Rauschert GmbH
Saint-Gobain Ceramic Materials Zhengzhou Co Ltd
Zimmer-Biomet holdings Inc
Report Scope:
In this report, the Global Bioceramics and Piezoceramics Market has been segmented

In this report, the Global Bioceramics and Piezoceramics Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Bioceramics and Piezoceramics Market, By Material:



Bio-Inert Ceramics	
Bio-Active Ceramics	
Bio-Resorbable Ceramics	
Piezoceramics	
Others	
Bioceramics and Piezoceramics Market, By Application:	
Dental Implants	
Orthopedic Implants	
Surgical Instruments	
Implantable Electronic Devices	
Diagnostic Instruments	
Others	
Bioceramics and Piezoceramics Market, By Region:	
North America	
United States	
Canada	
Mexico	
Europe	
France	

United Kingdom



Italy
Germany
Spain
Asia-Pacific
China
India
Japan
Australia
South Korea
South America
Brazil
Argentina
Colombia
Middle East & Africa
South Africa
Saudi Arabia
UAE
Kuwait
Turkey



Egypt

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Bioceramics and Piezoceramics Market.

Available Customizations:

Global Bioceramics and Piezoceramics Market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).



Contents

1. PRODUCT OVERVIEW

- 1.1. Market Definition
- 1.2. Scope of the Market
 - 1.2.1. Markets Covered
 - 1.2.2. Years Considered for Study
 - 1.2.3. Key Market Segmentations

2. RESEARCH METHODOLOGY

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Key Industry Partners
- 2.4. Major Association and Secondary Sources
- 2.5. Forecasting Methodology
- 2.6. Data Triangulation & Validation
- 2.7. Assumptions and Limitations

3. EXECUTIVE SUMMARY

- 3.1. Overview of the Market
- 3.2. Overview of Key Market Segmentations
- 3.3. Overview of Key Market Players
- 3.4. Overview of Key Regions/Countries
- 3.5. Overview of Market Drivers, Challenges, Trends

4. GLOBAL BIOCERAMICS AND PIEZOCERAMICS MARKET OUTLOOK

- 4.1. Market Size & Forecast
 - 4.1.1. By Value
- 4.2. Market Share & Forecast
- 4.2.1. By Material (Bio-Inert Ceramics, Bio-Active Ceramics, Bio-Resorbable Ceramics, Piezoceramics, Others)
- 4.2.2. By Application (Dental Implants, Orthopedic Implants, Surgical Instruments, Implantable Electronic Devices, Diagnostic Instruments, Others)
 - 4.2.3. By Region
- 4.2.4. By Company (2022)



- 4.3. Market Map
 - 4.3.1. By Material
 - 4.3.2. By Application
 - 4.3.3. By Region

5. ASIA PACIFIC BIOCERAMICS AND PIEZOCERAMICS MARKET OUTLOOK

- 5.1. Market Size & Forecast
 - 5.1.1. By Value
- 5.2. Market Share & Forecast
 - 5.2.1. By Material
 - 5.2.2. By Application
 - 5.2.3. By Country
- 5.3. Asia Pacific: Country Analysis
 - 5.3.1. China Bioceramics and Piezoceramics Market Outlook
 - 5.3.1.1. Market Size & Forecast
 - 5.3.1.1.1. By Value
 - 5.3.1.2. Market Share & Forecast
 - 5.3.1.2.1. By Material
 - 5.3.1.2.2. By Application
 - 5.3.2. India Bioceramics and Piezoceramics Market Outlook
 - 5.3.2.1. Market Size & Forecast
 - 5.3.2.1.1. By Value
 - 5.3.2.2. Market Share & Forecast
 - 5.3.2.2.1. By Material
 - 5.3.2.2.2. By Application
 - 5.3.3. Australia Bioceramics and Piezoceramics Market Outlook
 - 5.3.3.1. Market Size & Forecast
 - 5.3.3.1.1. By Value
 - 5.3.3.2. Market Share & Forecast
 - 5.3.3.2.1. By Material
 - 5.3.3.2.2. By Application
 - 5.3.4. Japan Bioceramics and Piezoceramics Market Outlook
 - 5.3.4.1. Market Size & Forecast
 - 5.3.4.1.1. By Value
 - 5.3.4.2. Market Share & Forecast
 - 5.3.4.2.1. By Material
 - 5.3.4.2.2. By Application
 - 5.3.5. South Korea Bioceramics and Piezoceramics Market Outlook



- 5.3.5.1. Market Size & Forecast
 - 5.3.5.1.1. By Value
- 5.3.5.2. Market Share & Forecast
 - 5.3.5.2.1. By Material
 - 5.3.5.2.2. By Application

6. EUROPE BIOCERAMICS AND PIEZOCERAMICS MARKET OUTLOOK

- 6.1. Market Size & Forecast
 - 6.1.1. By Value
- 6.2. Market Share & Forecast
 - 6.2.1. By Material
 - 6.2.2. By Application
 - 6.2.3. By Country
- 6.3. Europe: Country Analysis
 - 6.3.1. France Bioceramics and Piezoceramics Market Outlook
 - 6.3.1.1. Market Size & Forecast
 - 6.3.1.1.1. By Value
 - 6.3.1.2. Market Share & Forecast
 - 6.3.1.2.1. By Material
 - 6.3.1.2.2. By Application
 - 6.3.2. Germany Bioceramics and Piezoceramics Market Outlook
 - 6.3.2.1. Market Size & Forecast
 - 6.3.2.1.1. By Value
 - 6.3.2.2. Market Share & Forecast
 - 6.3.2.2.1. By Material
 - 6.3.2.2.2. By Application
 - 6.3.3. Spain Bioceramics and Piezoceramics Market Outlook
 - 6.3.3.1. Market Size & Forecast
 - 6.3.3.1.1. By Value
 - 6.3.3.2. Market Share & Forecast
 - 6.3.3.2.1. By Material
 - 6.3.3.2.2. By Application
 - 6.3.4. Italy Bioceramics and Piezoceramics Market Outlook
 - 6.3.4.1. Market Size & Forecast
 - 6.3.4.1.1. By Value
 - 6.3.4.2. Market Share & Forecast
 - 6.3.4.2.1. By Material
 - 6.3.4.2.2. By Application



- 6.3.5. United Kingdom Bioceramics and Piezoceramics Market Outlook
 - 6.3.5.1. Market Size & Forecast
 - 6.3.5.1.1. By Value
 - 6.3.5.2. Market Share & Forecast
 - 6.3.5.2.1. By Material
 - 6.3.5.2.2. By Application

7. NORTH AMERICA BIOCERAMICS AND PIEZOCERAMICS MARKET OUTLOOK

- 7.1. Market Size & Forecast
 - 7.1.1. By Value
- 7.2. Market Share & Forecast
 - 7.2.1. By Material
 - 7.2.2. By Application
 - 7.2.3. By Country
- 7.3. North America: Country Analysis
 - 7.3.1. United States Bioceramics and Piezoceramics Market Outlook
 - 7.3.1.1. Market Size & Forecast
 - 7.3.1.1.1 By Value
 - 7.3.1.2. Market Share & Forecast
 - 7.3.1.2.1. By Material
 - 7.3.1.2.2. By Application
 - 7.3.2. Mexico Bioceramics and Piezoceramics Market Outlook
 - 7.3.2.1. Market Size & Forecast
 - 7.3.2.1.1. By Value
 - 7.3.2.2. Market Share & Forecast
 - 7.3.2.2.1. By Material
 - 7.3.2.2.2 By Application
 - 7.3.3. Canada Bioceramics and Piezoceramics Market Outlook
 - 7.3.3.1. Market Size & Forecast
 - 7.3.3.1.1. By Value
 - 7.3.3.2. Market Share & Forecast
 - 7.3.3.2.1. By Material
 - 7.3.3.2.2. By Application

8. SOUTH AMERICA BIOCERAMICS AND PIEZOCERAMICS MARKET OUTLOOK

- 8.1. Market Size & Forecast
 - 8.1.1. By Value



- 8.2. Market Share & Forecast
 - 8.2.1. By Material
 - 8.2.2. By Application
 - 8.2.3. By Country
- 8.3. South America: Country Analysis
 - 8.3.1. Brazil Bioceramics and Piezoceramics Market Outlook
 - 8.3.1.1. Market Size & Forecast
 - 8.3.1.1.1. By Value
 - 8.3.1.2. Market Share & Forecast
 - 8.3.1.2.1. By Material
 - 8.3.1.2.2. By Application
 - 8.3.2. Argentina Bioceramics and Piezoceramics Market Outlook
 - 8.3.2.1. Market Size & Forecast
 - 8.3.2.1.1. By Value
 - 8.3.2.2. Market Share & Forecast
 - 8.3.2.2.1. By Material
 - 8.3.2.2.2. By Application
 - 8.3.3. Colombia Bioceramics and Piezoceramics Market Outlook
 - 8.3.3.1. Market Size & Forecast
 - 8.3.3.1.1. By Value
 - 8.3.3.2. Market Share & Forecast
 - 8.3.3.2.1. By Material
 - 8.3.3.2.2. By Application

9. MIDDLE EAST AND AFRICA BIOCERAMICS AND PIEZOCERAMICS MARKET OUTLOOK

- 9.1. Market Size & Forecast
 - 9.1.1. By Value
- 9.2. Market Share & Forecast
 - 9.2.1. By Material
 - 9.2.2. By Application
 - 9.2.3. By Country
- 9.3. MEA: Country Analysis
 - 9.3.1. South Africa Bioceramics and Piezoceramics Market Outlook
 - 9.3.1.1. Market Size & Forecast
 - 9.3.1.1.1. By Value
 - 9.3.1.2. Market Share & Forecast
 - 9.3.1.2.1. By Material



- 9.3.1.2.2. By Application
- 9.3.2. Saudi Arabia Bioceramics and Piezoceramics Market Outlook
 - 9.3.2.1. Market Size & Forecast
 - 9.3.2.1.1. By Value
 - 9.3.2.2. Market Share & Forecast
 - 9.3.2.2.1. By Material
 - 9.3.2.2.2. By Application
- 9.3.3. UAE Bioceramics and Piezoceramics Market Outlook
 - 9.3.3.1. Market Size & Forecast
 - 9.3.3.1.1. By Value
 - 9.3.3.2. Market Share & Forecast
 - 9.3.3.2.1. By Material
 - 9.3.3.2.2. By Application
- 9.3.4. Egypt Bioceramics and Piezoceramics Market Outlook
 - 9.3.4.1. Market Size & Forecast
 - 9.3.4.1.1. By Value
 - 9.3.4.2. Market Share & Forecast
 - 9.3.4.2.1. By Material
 - 9.3.4.2.2. By Application

10. MARKET DYNAMICS

- 10.1. Drivers
- 10.2. Challenges

11. MARKET TRENDS & DEVELOPMENTS

- 11.1. Recent Developments
- 11.2. Product Launches
- 11.3. Mergers & Acquisitions

12. GLOBAL BIOCERAMICS AND PIEZOCERAMICS MARKET: SWOT ANALYSIS

13. PORTER'S FIVE FORCES ANALYSIS

- 13.1. Competition in the Industry
- 13.2. Potential of New Entrants
- 13.3. Power of Suppliers
- 13.4. Power of Customers



13.5. Threat of Substitute Product

14. COMPETITIVE LANDSCAPE

- 14.1. Ceramtec GmbH
 - 14.1.1. Business Overview
 - 14.1.2. Company Snapshot
 - 14.1.3. Products & Services
 - 14.1.4. Current Capacity Analysis
 - 14.1.5. Financials (In case of listed)
 - 14.1.6. Recent Developments
 - 14.1.7. SWOT Analysis
- 14.2. Coorstek Inc.
- 14.3. DePuy Synthes Inc
- 14.4. H.C. Starck GmbH
- 14.5. Kyocera Corporation
- 14.6. Morgan Advanced Materials PLC
- 14.7. NGK Spark Plug Co., Ltd.
- 14.8. Rauschert GmbH
- 14.9. Saint-Gobain Ceramic Materials Zhengzhou Co Ltd
- 14.10. Zimmer-Biomet holdings Inc

15. STRATEGIC RECOMMENDATIONS

16. ABOUT US & DISCLAIMER



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