

Market Report

Global Biomedical Metal Market

Third Edition

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Abstract

Benefiting from robust growth in the application markets such as orthopaedic implant, cardiac/vascular implant and others, biomedical metal market is experiencing well above industry average growth. The advancements in biomaterials in turn massively boost the development of the biomedical devices industry.

The global demand on biomedical metals reached US\$14.52 billion in 2013. With a growth of approximately 7% annually in the next years, the market is expected to approach US\$18.96 billion by 2017 and to increase to US\$26.54 billion by 2022.

Stainless steels are still the largest product group of the biomedical metals, accounting for more than half of the total biomedical metal market, followed by titanium/Ti-alloys and cobalt-based alloys. Ti-alloys, although used as biomaterials for shorter time than other major biomedical grade metals, have most promising growth prospect thanks to their excellent biocompatibility and mechanochemical properties.

Acmite Market Intelligence has finished a most comprehensive report on world biomedical metal market. It is ready for order.

The report examines the current products and application areas, provides extensive market data of 2013, and market forecast through 2017 to 2022. It also outlines the competition landscape, evaluates market chances and risks and anticipates future trends based on a series of influence factors.

- Over 210 pages analyzing the market
- Ca. 60 figure tables
- 288 company profiles of leading manufacturers

With a multi-dimensional and in-depth view of world biomedical metal market, this report is ideal help for you with decisions about international market penetration, business expansion or project feasibility analysis.

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Note:

Regions:

North America: US, Canada, Mexico (NAFTA region)

Asia Pacific: Countries of Asia, Australia, New Zealand

Asia Pacific*: Asia Pacific excluding Japan

4.2 Titanium and Ti-based alloy

4.2.1 Products, properties and applications

Titanium is the most biocompatible of all metals due to its corrosion resistance, strength and low modulus. It is neither non-magnetic nor non-radio opaque and even fosters osseointegration (joint with bones & tissues). Its use in hip replacement and other joints has been well established for some 40 years.

Titanium metal is unique, being as strong as steel but 40 per cent lighter. Its high strength-to-weight ratio makes it attractive in many applications. Besides its extensive use in orthopaedic implant, titanium is also widely used for cardiovascular implants and surgical devices. Titanium instruments are used for micro-surgical operations and in military light weight field trauma relief kits. Titanium is also ideal material for dental posts and other oral prosthetics. Bone adheres well to the surface oxide of titanium without additional coatings. Titanium-nickel memory metal (nitinol) low modulus wire is used for correcting bracing. As a specialty titanium alloy, nitinol market will be explored in a separate chapter.

Based on the microstructures that can be produced by alloying, titanium alloys can be grouped as alpha, alpha-beta, and beta alloys.

Alloying elements that stabilize alpha titanium include aluminium, tin and zirconium.

Alloying elements act as beta stabilizers include vanadium, molybdenum, niobium, chromium, iron and manganese.

Among all alloys, beta titanium alloy offers more potential for implantation applications because of their ease of formability, biocompatibility chemical

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5. Application

5.1 Orthopaedic implant

5.1.1 Market segmentation

Biomaterials

Biomedical grade metals are the most commonly used biomaterials in orthopaedic implants.

Metallic biomaterials

- **Stainless Steel**

Stainless steel is a very strong and corrosion resistant alloy. There are many different types of stainless steel. The austenitic stainless steels (chromium-nickel stainless class), particularly types 316 and 316L, are most widely used for orthopaedic implants. The stainless steels used in orthopaedic implants are designed to resist the normal chemicals found in the human body.

- **Cobalt-chromium Alloys**

Cobalt-chromium alloys are also strong, hard, biocompatible, and corrosion resistant. They are particularly preferred for their high strength. These alloys are used in a variety of joint replacement implants, such as hip replacement and knee replacement where high strength is required. While cobalt-chromium alloys contain mostly cobalt and chromium, they also include other metals, such as molybdenum, to increase their strength.

- **Titanium Alloys**

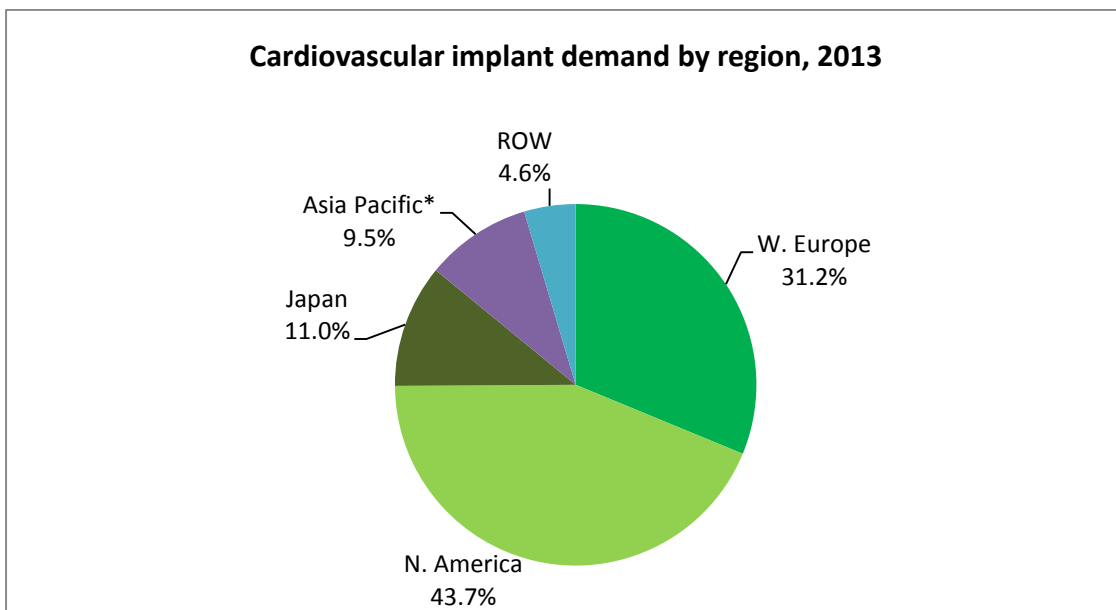
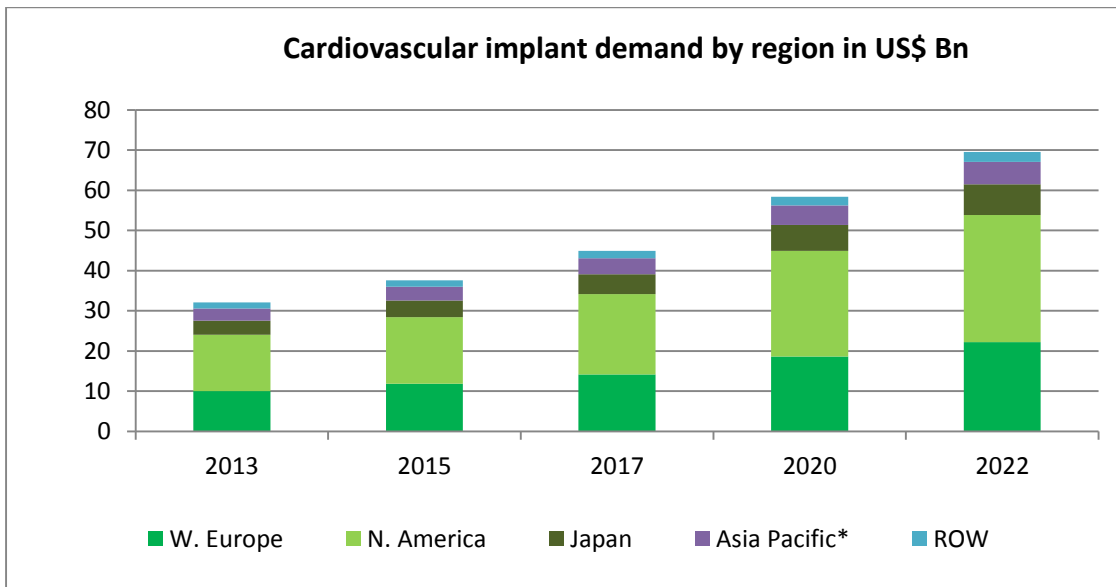
Titanium alloys are considered to be biocompatible. The lightness and good mechanochemical properties make them increasingly popular in orthopaedic implant. They are also the most flexible of all orthopaedic... ..

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5.4.2.4 Cardiovascular implant demand by region

Cardiovascular implant demand by region in US\$ Bn

	2013	2015	2017	2020	2022	CAGR
W. Europe	10.02	11.81	14.18	18.59	22.24	9.3%
N. America	14.01	16.59	19.97	26.33	31.62	9.5%
Japan	3.54	4.15	4.95	6.43	7.65	9.0%
Asia Pacific*	3.04	3.43	3.95	4.86	5.57	7.0%
ROW	1.48	1.64	1.85	2.21	2.49	6.0%
Total	32.08	37.62	44.89	58.42	69.56	9.1%



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Year of foundation: 1889

Number of employees 2009: 3,200

Revenue 2012: US\$2,271.70 million

Company profile

Carpenter (NYSE:CRS) is a leader in the development, manufacture and distribution of cast/wrought and powder metal stainless steels and specialty alloys including high temperature (iron-nickel-cobalt base), stainless, superior corrosion resistant, controlled expansion alloys, ultra high-strength and implantable alloys, tool and die steels, and other specialty metals as well as cast/wrought titanium alloys.

The company provides materials solutions to the automotive, aerospace, energy, industrial, medical, defence, and consumer products industries.

The company operates three product lines:

- **Stainless Steels & Specialty Alloys.** It manufactures high-strength and high-temperature alloys, magnetic and controlled-expansion alloys, superior corrosion-resistant alloys and other specialty metals.
- **Titanium Alloys.** It supplies titanium alloy products for the aerospace, medical, consumer, motorsports and recreation industries. Forms include (Vol. II P.92)



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