

India Biological and Biomedical Materials Market Assessment, By Type [Biological, Biomedical], By Materials [Metals, Ceramics, Polymers, Others], By Applications [Medical Implants, Ophthalmology, Tissues Engineering, Biosensors, Drug-delivery Systems, Others], By Region, Opportunities and Forecast, FY2017-FY2031F

https://marketpublishers.com/r/IC5FC91F60C6EN.html

Date: March 2025 Pages: 103 Price: US\$ 3,300.00 (Single User License) ID: IC5FC91F60C6EN

# **Abstracts**

India biological and biomedical materials market size was valued at USD 2.5 billion in FY2023, which is expected to reach USD 7.6 billion in FY2031, with a CAGR of 14.8% for the forecast period between FY2024 and FY2031. The discovery of biomedical materials is imperatively revolutionizing modern medicinal treatment by restoring normal functioning and achieving healing for patients after undergoing complex surgeries. Living cells, tissues, metals, ceramics, and plastics can be reengineered into desired mold and parts, fibers, films that are progressively used in biomedical products and devices. Sealants and patches made from biomedical materials are significantly allowing damaged tissue to regenerate and heal in a shorter time. As patients with diabetic ulcers are prone to severe infections, they are treated with biomaterials, which leads to healing while reducing unnecessary dressing replacements.

Prominent government organizations and institutions are conducting innovative research on developing technologies and products leading to affordable healthcare under the mandated government program. An eminent collaboration of Dr. Reddy's Institute of Life Sciences Hyderabad and University of Hyderabad developed microneedles that are potentially impacting the iron and vitamin B12 status of 170 million Indian women lying in the reproductive age and around 480 million children. IISc Bangalore has developed Fluorescence based optical volume screening system



(OVSS) for interrogating multicellular organisms.

Incorporation of Innovative Biomedical Material into Drug Delivery Systems

Biomaterials are considered a prominent asset, significantly driving the advanced drug delivery systems; they can facilitate surgery, implantation, and treatment of serious oral diseases such as periodontitis, peri-implantitis, and severe dental problems. Natural polymeric substances such as calcium phosphate, chitosan, gelatin, are substantially used to prepare various drug delivery systems. Biomedical materials have significant characteristics like antibacterial and anti-inflammatory effects and are potentially active in enhancing antibiotic activities in oral infections. In addition to oral delivery, biomedical materials are successively creating avenues for drug delivery through transdermal, pulmonary, ocular, and nasal routes where specific designing of biomaterials accomplish the desired delivery actions.

India has been progressive for spending enormous money on improving the healthcare sector. Under India's National Health Policy, 2017, the government substantially aimed to increase spending on health by 2025 to 2.5% of GDP. In the Union Budget 2021-2022, the Indian government allocated USD 27 billion for the healthcare and wellbeing of its citizens. The huge potential of biological and biomedical materials in drug delivery systems has impeccable market opportunities to exponentially expand with the rising health sector and significant government investments.

Regulatory Adoption for Implementation of Biological and Biomedical Materials

Numerous international and country-specific standards and guidelines have been framed to regulate utilizing biological and biomedical materials. Assuring effectiveness and enabling execution, some of the recognized institutions are International Organizations for Standard guidelines, ASTM International, the United States Pharmacopeial Convention, and European Conformity Marking. Several standard tests and practices are being incorporated like testing of polymeric biological materials that are extensively used in surgical implants, assessment of selected tissue effects of absorbable biomaterials for implant with respect to muscles and bones.

Hyaluronic Acid Biopolymer is Revolutionizing the Cosmetic and Pharma Industries

Hyaluronic acid (HA) biopolymer is a naturally occurring material, delivering an imperative role in the wound healing process, generating a massive potential in regenerative medicine. Due to its valuable physicochemical properties, HA biopolymer



is progressively used for treating various medical conditions including arthritis treatment (osteoarthritis), dry eye syndrome, ocular surgery (ophthalmology), cosmetic space (plastic surgery, skincare), drug delivery, etc. Hyaluronic acid is engaged in soft tissue hydration and structural scaffolding that prominently provides viscoelasticity, leading to proper lubrications and impart shock absorbing functionalities.

An apex national organization of India IBHA, that represents the cosmetics, beauty, hygiene, and personal care units in India has an estimated industry size of USD 13 billion in 2021, which is substantially growing at 8-9% annually. A report published by National Investment Promotion & Facilitation Agency estimated the market size of personal care and hygiene sector at around USD 15.050 billion, during the financial year 2022.

Biomedical Materials in Medical Implants is Successively Revolutionizing Market

The advancement in medical technology has consequently led to innovative medical implant materials varying from conventional silicone to 3D-printed biomaterials. Ultrahigh molecular-weight polyethylene (UHMWPE) and hip replacement implants are progressively used in knee replacements. Cross-linked polyethylene (XLPE) can accomplish hip implants, removing the revision surgery requirement. 3D-printed implantable materials are gaining interest with a microfluidic approach that has prominently led to leaps in the vascularization of engineering tissues. In Australia, researchers have significantly developed a 3D printing Biopen device called Biosphere, enabling surgeons to repair damaged bones and cartilage by generating new cells directly.

India ranked 4th largest in the Asian medical device market and 20th globally. An extensive category of medical devices, from consumables to implantables, are utilized in India, where the majority includes drug-eluting stents, cardiac stents, orthopedic implants, intraocular lenses, etc. In April 2023, an achievement for Hindustan Syringes & Medical Devices Ltd. was appraised as they successfully supplied 1.75 billion syringes. Medtronic, a leading biomaterial company, has hugely invested around USD 362.8 million in India to expand Medtronic Engineering & Innovative Center in Hyderabad, India.

#### Impact of COVID-19

The outbreak of COVID-19 had a devastating impact on mankind. Biomaterials, being an essential element for several medical implant practices, like treating arthritis, joint



replacements, etc., has emerged incredibly. India has been at the forefront in developing indigenous diagnostics during the COVID-19 where the DBT has announced the call on "COVID Research Consortium" and successfully commissioned COVID-19 diagnostics kits. Biomedical materials have diverse applications for enhancing COVID-19 immunotherapeutic in developing preventing vaccines, infection treatments, healing, and regeneration of damaged tissues. The pandemic situation in India was evergrowing for the medical treatments and created huge potential for the biological and biomedical materials market.

#### Impact of Russia-Ukraine War

The invasion of Russia on Ukraine has led to unprecedented impact on various sectors subsequently leading to deterioration of global economy including healthcare. A project named KOROVAI designed for the international community is providing aid to Ukraine with the coordination of medical material gifting. The financial sanctions on Russia by the Western countries led to severe outcomes on Russian health care facilities as Russia imports massive number of medical devices from the United States and European countries. These imperative factors severely impacted the applications of biomedical materials in treatments. The measures adopted by significant government agencies to overcome the disaster of aggression and retain the economic instability.

Key Players Landscape and Outlook

The contribution of biomedical materials has engaged numerous healthcare industries to enhance innovative research which has extreme potential market growth. Syngene International Ltd. is successively incorporating hyaluronic acid (HA) biopolymer has potential of various biochemical processes like wound healing, tissue repairing, cell proliferation and differentiation, etc. In osteoarthritis treatment the approval of HA has enabled patients for treating degenerative knee arthritis via intra-articular injections. In addition to relevant treatments HA is progressively used as a dermal filler in cosmetic surgery to lift sunken areas in face during plastic surgery. In July 2023 Syngene announced the successful acquisition of Unit 3 biologics manufacturing facilities in Bangalore from Stelis Biopharma Ltd. (SBL) for a gross value of around USD 86 million. The facility is incorporated with advanced technologies to develop COVID-19 vaccines which has upgraded to manufacture monoclonal antibodies by further investing around USD 12 million.



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\*Companies mentioned above DO NOT hold any order as per market share and can be changed as per information available during research work

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