

The Global Market for White (Industrial) Biotechnology 2024-2035

<https://marketpublishers.com/r/GF1E99C28595EN.html>

Date: June 2024

Pages: 569

Price: US\$ 1,450.00 (Single User License)

ID: GF1E99C28595EN

Abstracts

White biotechnology, also known as industrial biotechnology, harnesses the power of living cells and enzymes to create eco-friendly, sustainable products and processes. This cutting-edge field is transforming industries worldwide, offering innovative solutions for biomanufacturing, biofuels, bioplastics, and beyond. Key tools like metabolic engineering, fermentation, enzymatic biocatalysis, and directed evolution allow the biology of bacteria, yeast and algae to be optimized as microbial cell factories. Their metabolism can be tailored to convert sugars, waste lipids and even CO₂ into target compounds like ethanol, organic acids, biopolymers and more. White biotechnology enables the sustainable production of both high-volume commodities as well as fine chemicals for pharmaceuticals. It allows renewable feedstocks like agricultural wastes and algae to be utilized as inputs. Biomanufacturing processes can achieve high specificity under mild conditions with far less waste than conventional chemistry.

The Global Market for White (Industrial) Biotechnology 2024-2035 is an in-depth market research report that explores the current state and future prospects of this sector. The report provides a comprehensive analysis of the white biotechnology market, covering key application areas such as biomanufacturing, biofuels, bio-based chemicals, bioplastics and biopolymers, bioremediation, biocatalysis, food and nutraceutical ingredients, agricultural biotechnology, textiles, consumer goods, biopharmaceuticals, cosmetics, surfactants and detergents, and construction materials.

The report covers the latest TECHNOLOGICAL advancements driving the white biotechnology market, including synthetic biology, metabolic engineering, protein engineering, fermentation processes, and more. It also examines the various production hosts, such as bacteria, yeast, fungi, marine organisms, and photosynthetic organisms, as well as the diverse range of feedstocks used, from C₁ and C₂ compounds to

lignocellulosic biomass, plastic waste, and CO₂.

The Global Market for White (Industrial) Biotechnology 2024-2035 offers invaluable insights into the market trends, growth drivers, challenges, and opportunities shaping the future of this industry. The report features a comprehensive market analysis, including a SWOT analysis, market map, competitive landscape, and detailed profiles of over 380 key players in the white biotechnology space.

With global revenues for white biotechnology projected to soar in the coming years, this report is an essential resource for businesses, investors, and researchers seeking to capitalize on the immense potential of this sustainable, bio-based revolution.

Principles and tools of white biotechnology. Analysis of major host organisms - engineered bacteria, yeast, algae, fungi - used in industrial biotechnology.

Key end product applications and markets. Markets covered include biofuels, renewable chemicals, bioplastics, ingredients, agriculture, cosmetics, textiles, and more. Analysis of market drivers, challenges, regulations, and outlook.

Insights into biomanufacturing processes and scale-up for commercialization. Batch vs continuous processing, bioreactors, downstream separation, and process analytical techniques.

Techno-economic analysis and market outlook.

Latest trends and future opportunities.

Global market revenues to 2035

>380 company profiles spanning feedstock supply, biomanufacturing, and end-product companies. Analysis of how start-ups, SMEs, and large corporations are applying biotech across the value chain. Profiles include products, technical specifications and contact details. Companies profiled include Aanika Biosciences, Absci, ?IO, Amyris, Apeel, Agrivida, Ardra Bio, BigHat Biosciences, BioAge Labs, Bioptimus, Bolt Threads, Cascade Biocatalysts, C16 Biosciences, Circe, Cradle, Danimer Scientific, Debut Biotechnology, Deepcell, Erebagen, Eligo Bioscience, Evozyne, Fermelanta, Future Fields, Geltor, Generate:Biomedicines, Gingko Bioworks, Green Bioactives, HydGene Renewables, Iambic Therapeutics, Impossible Foods, Industrial Microbes,

Insilico Medicine, LanzaTech, Leash Biosciences, Metabolic Explorer, Michroma, Model Medicines, Modern Meadow, Newlight Technologies, Noetik, Novozymes, Onego Bio, Pearl Bio, Pivot Bio, Profluent Bio, Provectus Algae, Seminal Biosciences, Spiber, Succinity, Terra Bioindustries, Terray Therapeutics, Visolis, Xaira, Yali Bio and Yoneda Labs (Full list of companies profiled in table of contents).

Contents

1 RESEARCH METHODOLOGY

2 INTRODUCTION

- 2.1 Biotechnology colours
- 2.2 Definition
- 2.3 Comparison with conventional processes
- 2.4 Markets and applications
- 2.5 Advantages
- 2.6 Sustainability
- 2.7 White Biotechnology for the Circular Economy
 - 2.7.1 Agricultural Waste
 - 2.7.2 Forestry and Paper Waste
 - 2.7.3 Gas Fermentation
 - 2.7.4 Plastics Upcycling
 - 2.7.5 Wastewater Valorization

3 TECHNOLOGY ANALYSIS

- 3.1 Production hosts
 - 3.1.1 Bacteria
 - 3.1.2 Yeast
 - 3.1.3 Fungi
 - 3.1.4 Marine
 - 3.1.5 Enzymes
 - 3.1.6 Photosynthetic organisms
- 3.2 Biomanufacturing processes
 - 3.2.1 Batch biomanufacturing
 - 3.2.2 Continuous biomanufacturing
- 3.3 Cell factories for biomanufacturing
- 3.4 Synthetic Biology
 - 3.4.1 Technology Overview
 - 3.4.2 Metabolic engineering
 - 3.4.2.1 DNA synthesis
 - 3.4.2.2 CRISPR
 - 3.4.2.2.1 CRISPR/Cas9-modified biosynthetic pathways
 - 3.4.3 Protein/Enzyme Engineering

- 3.4.4 Strain construction and optimization
- 3.4.5 Synthetic biology and metabolic engineering
- 3.4.6 Smart bioprocessing
- 3.4.7 Cell-free systems
- 3.4.8 Chassis organisms
- 3.4.9 Biomimetics
- 3.4.10 Sustainable materials
- 3.4.11 Robotics and automation
 - 3.4.11.1 Robotic cloud laboratories
 - 3.4.11.2 Automating organism design
 - 3.4.11.3 Artificial intelligence and machine learning
- 3.4.12 Fermentation Processes
- 3.5 Generative Biology
 - 3.5.1 Generative Models
 - 3.5.2 Generative Adversarial Networks (GANs)
 - 3.5.2.1 Variational Autoencoders (VAEs)
 - 3.5.2.2 Normalizing Flows
 - 3.5.2.3 Autoregressive Models
 - 3.5.2.4 Evolutionary Generative Models
 - 3.5.3 Design Optimization
 - 3.5.3.1 Evolutionary Algorithms (e.g., Genetic Algorithms, Evolutionary Strategies)
 - 3.5.3.1.1 Genetic Algorithms (GAs)
 - 3.5.3.1.2 Evolutionary Strategies (ES)
 - 3.5.3.2 Reinforcement Learning
 - 3.5.3.3 Multi-Objective Optimization
 - 3.5.3.4 Bayesian Optimization
 - 3.5.4 Computational Biology
 - 3.5.4.1 Molecular Dynamics Simulations
 - 3.5.4.2 Quantum Mechanical Calculations
 - 3.5.4.3 Systems Biology Modeling
 - 3.5.4.4 Metabolic Engineering Modeling
 - 3.5.5 Data-Driven Approaches
 - 3.5.5.1 Machine Learning
 - 3.5.5.2 Graph Neural Networks
 - 3.5.5.3 Unsupervised Learning
 - 3.5.5.4 Active Learning and Bayesian Optimization
 - 3.5.6 Agent-Based Modeling
 - 3.5.7 Hybrid Approaches
- 3.6 Feedstocks

- 3.6.1 C1 feedstocks
 - 3.6.1.1 Advantages
 - 3.6.1.2 Pathways
 - 3.6.1.3 Challenges
 - 3.6.1.4 Non-methane C1 feedstocks
 - 3.6.1.5 Gas fermentation
- 3.6.2 C2 feedstocks
- 3.6.3 Biological conversion of CO₂
- 3.6.4 Food processing wastes
- 3.6.5 Lignocellulosic biomass
- 3.6.6 Methane
- 3.6.7 Municipal solid wastes
- 3.6.8 Plastic wastes
- 3.6.9 Plant oils
- 3.6.10 Starch
- 3.6.11 Sugars
- 3.6.12 Used cooking oils
- 3.6.13 Green hydrogen production
- 3.6.14 Blue hydrogen production
- 3.7 Blue biotechnology (Marine biotechnology)
 - 3.7.1 Cyanobacteria
 - 3.7.2 Macroalgae
 - 3.7.3 Companies

4 MARKET ANALYSIS

- 4.1 Market trends and growth drivers
- 4.2 Industry challenges and constraints
- 4.3 White biotechnology in the bioeconomy
- 4.4 SWOT analysis
- 4.5 Market map
- 4.6 Key market players and competitive landscape
- 4.7 Regulations
 - 4.7.1 United States
 - 4.7.2 European Union
 - 4.7.3 International
 - 4.7.4 Specific Regulations and Guidelines
- 4.8 Main end-use markets
 - 4.8.1 Biofuels

- 4.8.1.1 Market supply chain
- 4.8.1.2 Solid Biofuels
- 4.8.1.3 Liquid Biofuels
- 4.8.1.4 Gaseous Biofuels
- 4.8.1.5 Conventional Biofuels
- 4.8.1.6 Advanced Biofuels
- 4.8.1.7 Feedstocks
 - 4.8.1.7.1 First-generation (1-G)
 - 4.8.1.7.2 Second-generation (2-G)
 - 4.8.1.7.2.1 Lignocellulosic wastes and residues
 - 4.8.1.7.2.2 Biorefinery lignin
 - 4.8.1.7.3 Third-generation (3-G)
 - 4.8.1.7.3.1 Algal biofuels
 - 4.8.1.7.3.1.1 Properties
 - 4.8.1.7.3.1.2 Advantages
 - 4.8.1.7.4 Fourth-generation (4-G)
 - 4.8.1.7.5 Energy crops
 - 4.8.1.7.6 Agricultural residues
 - 4.8.1.7.7 Manure, sewage sludge and organic waste
 - 4.8.1.7.8 Forestry and wood waste
 - 4.8.1.7.9 Feedstock costs
- 4.8.1.8 Bioethanol
 - 4.8.1.8.1 Ethanol to jet fuel technology
 - 4.8.1.8.2 Methanol from pulp & paper production
 - 4.8.1.8.3 Sulfite spent liquor fermentation
 - 4.8.1.8.4 Gasification
 - 4.8.1.8.4.1 Biomass gasification and syngas fermentation
 - 4.8.1.8.4.2 Biomass gasification and syngas thermochemical conversion
 - 4.8.1.8.5 CO₂ capture and alcohol synthesis
 - 4.8.1.8.6 Biomass hydrolysis and fermentation
 - 4.8.1.8.7 Separate hydrolysis and fermentation
 - 4.8.1.8.7.1 Simultaneous saccharification and fermentation (SSF)
 - 4.8.1.8.7.2 Pre-hydrolysis and simultaneous saccharification and fermentation (PSSF)
 - 4.8.1.8.7.3 Simultaneous saccharification and co-fermentation (SSCF)
 - 4.8.1.8.7.4 Direct conversion (consolidated bioprocessing) (CBP)
- 4.8.1.9 Biodiesel
- 4.8.1.10 Biogas
 - 4.8.1.10.1 Biomethane

- 4.8.1.10.2 Feedstocks
- 4.8.1.10.3 Anaerobic digestion
- 4.8.1.11 Renewable diesel
- 4.8.1.12 Biojet fuel
- 4.8.1.13 Algal biofuels (blue biotech)
 - 4.8.1.13.1 Conversion pathways
 - 4.8.1.13.2 Market challenges
 - 4.8.1.13.3 Prices
 - 4.8.1.13.4 Producers
- 4.8.1.14 Biohydrogen
 - 4.8.1.14.1 Biological Conversion Routes
 - 4.8.1.14.1.1 Bio-photochemical Reaction
 - 4.8.1.14.1.2 Fermentation and Anaerobic Digestion
- 4.8.1.15 Biobutanol
- 4.8.1.16 Bio-based methanol
 - 4.8.1.16.1 Anaerobic digestion
 - 4.8.1.16.2 Biomass gasification
 - 4.8.1.16.3 Power to Methane
- 4.8.1.17 Bioisoprene
- 4.8.1.18 Fatty Acid Esters
- 4.8.2 Bio-based chemicals
 - 4.8.2.1 Market supply chain
 - 4.8.2.2 Acetic acid
 - 4.8.2.3 Adipic acid
 - 4.8.2.4 Aldehydes
 - 4.8.2.5 Acrylic acid
 - 4.8.2.6 Bacterial cellulose
 - 4.8.2.7 1,4-Butanediol (BDO)
 - 4.8.2.8 Bio-DME
 - 4.8.2.9 Dodecanedioic acid (DDDA)
 - 4.8.2.10 Ethylene
 - 4.8.2.11 3-Hydroxypropionic acid (3-HP)
 - 4.8.2.12 1,3-Propanediol (1,3-PDO)
 - 4.8.2.13 Itaconic acid
 - 4.8.2.14 Lactic acid (D-LA)
 - 4.8.2.15 1,5-diaminopentane (DA5)
 - 4.8.2.16 Tetrahydrofuran (THF)
 - 4.8.2.17 Malonic acid
 - 4.8.2.18 Monoethylene glycol (MEG)

- 4.8.2.19 Propylene
- 4.8.2.20 Succinic acid (SA)
- 4.8.2.21 Triglycerides
- 4.8.2.22 Enzymes
- 4.8.2.23 Vitamins
- 4.8.2.24 Antibiotics
- 4.8.3 Bioplastics and Biopolymers
 - 4.8.3.1 Market supply chain
 - 4.8.3.2 Polylactic acid (PLA)
 - 4.8.3.3 PHAs
 - 4.8.3.3.1 Types
 - 4.8.3.3.1.1 PHB
 - 4.8.3.3.1.2 PHBV
 - 4.8.3.3.2 Synthesis and production processes
 - 4.8.3.3.3 Commercially available PHAs
 - 4.8.3.4 Bio-PET
 - 4.8.3.5 Starch blends
 - 4.8.3.6 Protein-based bioplastics
- 4.8.4 Bioremediation
- 4.8.5 Biocatalysis
 - 4.8.5.1 Biotransformations
 - 4.8.5.2 Cascade biocatalysis
 - 4.8.5.3 Co-factor recycling
 - 4.8.5.4 Immobilization
- 4.8.6 Food and Nutraceutical Ingredients
 - 4.8.6.1 Market supply chain
 - 4.8.6.2 Alternative Proteins
 - 4.8.6.3 Natural Sweeteners
 - 4.8.6.4 Natural Flavors and Fragrances
 - 4.8.6.5 Texturants and Thickeners
 - 4.8.6.6 Nutraceuticals and Supplements
- 4.8.7 Agricultural biotechnology
 - 4.8.7.1 Market supply chain
 - 4.8.7.2 Biofertilizers
 - 4.8.7.2.1 Overview
 - 4.8.7.2.2 Companies
 - 4.8.7.3 Biopesticides
 - 4.8.7.3.1 Overview
 - 4.8.7.3.2 Companies

- 4.8.7.4 Biostimulants
 - 4.8.7.4.1 Overview
 - 4.8.7.4.2 Companies
- 4.8.7.5 Crop Biotechnology
 - 4.8.7.5.1 Genetic engineering
 - 4.8.7.5.2 Genome editing
 - 4.8.7.5.3 Companies
- 4.8.8 Textiles
 - 4.8.8.1 Market supply chain
 - 4.8.8.2 Bio-Based Fibers
 - 4.8.8.2.1 Lyocell
 - 4.8.8.2.2 Bacterial cellulose
 - 4.8.8.2.3 Algae textiles
 - 4.8.8.3 Recombinant Materials
 - 4.8.8.4 Sustainable Processing
- 4.8.9 Consumer goods
 - 4.8.9.1 Market supply chain
 - 4.8.9.2 White biotechnology in consumer goods
- 4.8.10 Biopharmaceuticals
 - 4.8.10.1 Market supply chain
 - 4.8.10.2 Market overview for white biotechnology
- 4.8.11 Cosmetics
 - 4.8.11.1 Market supply chain
 - 4.8.11.2 Market overview for white biotechnology
- 4.8.12 Surfactants and detergents
 - 4.8.12.1 Market supply chain
 - 4.8.12.2 Market overview for white biotechnology
- 4.8.13 Construction materials
 - 4.8.13.1 Market supply chain
 - 4.8.13.2 Biocement
 - 4.8.13.3 Mycelium materials
- 4.9 Global market revenues 2018-2035
 - 4.9.1 By market
- 4.10 By region
- 4.11 Future Market Outlook

5 COMPANY PROFILES

5.1 Aanika Biosciences

- 5.2 Absci Corp
- 5.3 Aemetis, Inc.
- 5.4 AEP Polymers
- 5.5 AgBiome
- 5.6 Agrivida
- 5.7 AIO
- 5.8 AI Proteins
- 5.9 Algal Bio Co., Ltd.
- 5.10 Algenol
- 5.11 AlgiKnit
- 5.12 Algicel ApS
- 5.13 AgriSea NZ Seaweed Ltd
- 5.14 Alpha Biofuels (Singapore) Pte Ltd
- 5.15 Allonnia LLC
- 5.16 Allozymes
- 5.17 Alt.Leather
- 5.18 Alto Neuroscience
- 5.19 AmphiStar
- 5.20 Amphista Therapeutics
- 5.21 Amply Discovery
- 5.22 AMSilk GmbH
- 5.23 Andes Ag, Inc.
- 5.24 Antheia
- 5.25 Apeel Sciences
- 5.26 Aqemia
- 5.27 Aralez Bio
- 5.28 Arctic Biomaterials Oy
- 5.29 Ardra Bio
- 5.30 Arkeon
- 5.31 Arzeda
- 5.32 Asimov
- 5.33 Atantares
- 5.34 Athos Therapeutics
- 5.35 Atomwise
- 5.36 Aurigene Pharmaceutical Services
- 5.37 Autolus
- 5.38 AVA Biochem AG
- 5.39 Avantium B.V.
- 5.40 Avicenna Biosciences

- 5.41 Azolla
- 5.42 Axcelon Biopolymers Corporation
- 5.43 Basecamp Research
- 5.44 BBKA Biochemical & GALACTIC Lactic Acid Co., Ltd.
- 5.45 Benefuel Inc.
- 5.46 BenevolentAI
- 5.47 BigHat Biosciences
- 5.48 BioAge Labs
- 5.49 BioBetter
- 5.50 Biocatalysts Ltd.
- 5.51 Bioextrax AB
- 5.52 Bio Fab NZ
- 5.53 Biokemik
- 5.54 Biolexis Therapeutics
- 5.55 BIOLO
- 5.56 BioMap
- 5.57 Biomason, Inc.
- 5.58 Biomatter Designs
- 5.59 Bioptimus SAS
- 5.60 BioPhy
- 5.61 Bioplastech Ltd
- 5.62 BioSmart Nano
- 5.63 Biotic Circular Technologies Ltd.
- 5.64 Biosyntia
- 5.65 Biotecam
- 5.66 Bioweg
- 5.67 bit.bio
- 5.68 Bloom Biorenewables SA
- 5.69 BluCon Biotech GmbH
- 5.70 Blue BioFuels, Inc.
- 5.71 Bluepha Beijing Lanjing Microbiology Technology Co., Ltd.
- 5.72 Bon Vivant
- 5.73 Bolt Threads
- 5.74 Bosk Bioproducts Inc.
- 5.75 Bowil Biotech Sp. z o.o.
- 5.76 Braskem SA
- 5.77 Brightseed
- 5.78 Bucha Bio, Inc.
- 5.79 C1 Green Chemicals AG

- 5.80 C16 Biosciences
- 5.81 CABIO Biotech (Wuhan) Co, Ltd
- 5.82 California Cultured
- 5.83 Calysta
- 5.84 Cambrium GmbH
- 5.85 Camena Bioscience
- 5.86 Capra Biosciences
- 5.87 Carbios
- 5.88 Cargill
- 5.89 Calyxt
- 5.90 Cascade Biocatalysts
- 5.91 Cass Materials Pty Ltd
- 5.92 Catalyxx
- 5.93 Cauldron
- 5.94 Cemvita Factory Inc.
- 5.95 Century Health Technology, Inc.
- 5.96 ChainCraft
- 5.97 Checkerspot
- 5.98 Chitose Bio Evolution Pte Ltd.
- 5.99 CinderBio
- 5.100 Circe
- 5.101 CJ Biomaterials, Inc.
- 5.102 Clean Food Group
- 5.103 Codexis
- 5.104 Colorifix
- 5.105 Colossal Biosciences
- 5.106 Colipi
- 5.107 Colorifix
- 5.108 Conagen
- 5.109 Constructive Bio
- 5.110 Cradle
- 5.111 Cysbio
- 5.112 Danimer Scientific
- 5.113 Debut Biotechnology
- 5.114 Deepcell
- 5.115 DeepCure
- 5.116 Deep Genomics
- 5.117 Deep Branch Biotechnology
- 5.118 Demetrix

- 5.119 Design Therapeutics
- 5.120 Diagonal Therapeutics
- 5.121 Diffuse Bio
- 5.122 Dispersa
- 5.123 DNA Script
- 5.124 Domsjo Fabriker AB
- 5.125 DuPont
- 5.126 Earli
- 5.127 Ecovative Design LLC
- 5.128 Eco Fuel Technology, Inc
- 5.129 Eden Brew
- 5.130 EggPlant Srl
- 5.131 Eligo Bioscience
- 5.132 Elo Life Systems
- 5.133 Emerging Fuels Technology (EFT)
- 5.134 EnginZyme AB
- 5.135 Eni S.p.A.
- 5.136 EnPlusOne Biosciences
- 5.137 Enzymaster
- 5.138 Enzymit
- 5.139 Enzyan Biocatalysis GmbH
- 5.140 Etcembly
- 5.141 Evaxion Biotech A/S
- 5.142 Eversyn
- 5.143 Evozyne
- 5.144 Exscientia
- 5.145 FabricNano
- 5.146 Fermentalg
- 5.147 eniferBio
- 5.148 ENOUGH
- 5.149 Epoch Biodesign
- 5.150 Erebagen
- 5.151 Evolved By Nature
- 5.152 Evonik Industries AG
- 5.153 EV Biotech
- 5.154 FabricNano
- 5.155 Farmless
- 5.156 Fermelanta
- 5.157 Fermentalg

- 5.158 Full Cycle Bioplastics LLC
- 5.159 Futerro
- 5.160 Future Fields
- 5.161 Futurity Bio-Ventures Ltd.
- 5.162 Gaiamer Biotechnologies
- 5.163 Geltor
- 5.164 Gen3Bio
- 5.165 Genecis Bioindustries, Inc.
- 5.166 Generate:Biomedicines
- 5.167 Genesis Therapeutics
- 5.168 Gero
- 5.169 Gevo, Inc
- 5.170 Genomatica
- 5.171 Ginkgo Bioworks
- 5.172 GlaxoSmithKline (GSK)
- 5.173 Global Bioenergies SA
- 5.174 Google Deepmind
- 5.175 Green Bioactives
- 5.176 Green Earth Institute
- 5.177 Healx
- 5.178 Hexagon Bio
- 5.179 Honext Material SL
- 5.180 Humintech GmbH
- 5.181 Huue, Inc.
- 5.182 HydGene Renewables
- 5.183 HydRegen
- 5.184 Hyfe
- 5.185 Iambic Therapeutics
- 5.186 Ibex Medical Analytics
- 5.187 Idoven
- 5.188 Iktos
- 5.189 Imperagen Limited
- 5.190 Impossible Foods
- 5.191 Inceptive
- 5.192 Indee Labs
- 5.193 Insempra
- 5.194 Insilico Medicine
- 5.195 Insitro
- 5.196 Integrated Biosciences

- 5.197 Ittinsect
- 5.198 Iogen Corporation
- 5.199 Isomorphic Laboratories
- 5.200 Itaconix
- 5.201 Johnson Matthey
- 5.202 Kalion, Inc.
- 5.203 Kane Biotech, Inc.
- 5.204 Kinish
- 5.205 Kraig Biocraft Laboratories
- 5.206 Kuano
- 5.207 Lanzatech
- 5.208 LCY Biosciences
- 5.209 Leash Biosciences
- 5.210 Liberation Labs
- 5.211 Loam Bio
- 5.212 Leaf Resources Ltd.
- 5.213 Light Bio
- 5.214 Lignoflow Technologies AB
- 5.215 Lignolix, Inc.
- 5.216 LignoPure GmbH
- 5.217 Lignovations GmbH
- 5.218 Living Ink Technologies
- 5.219 Lixea Limited
- 5.220 Lumen Bioscience
- 5.221 Lygos, Inc
- 5.222 LXP Group GmbH
- 5.223 MadeRight
- 5.224 MakeGrowLab
- 5.225 Mana.bio
- 5.226 Mango Materials, Inc.
- 5.227 Marea
- 5.228 Melt & Marble
- 5.229 MedPHA Bio-Tech Co., Ltd.
- 5.230 Menten AI
- 5.231 METabolic EXplorer S.A. (METEX)
- 5.232 Metgen Oy
- 5.233 Michroma
- 5.234 MiLaboratories, Inc.
- 5.235 Miruku

- 5.236 Modern Meadow, Inc.
- 5.237 Modern Synthesis
- 5.238 Mogrify
- 5.239 Model Medicines
- 5.240 Molecular Assemblies
- 5.241 Molecular Quantum Solutions
- 5.242 Moolec Science
- 5.243 Multus Biotechnology
- 5.244 MycoCycle, Inc.
- 5.245 MycoTechnology
- 5.246 MYCL
- 5.247 MycoWorks
- 5.248 Myconeos
- 5.249 Mylium BV
- 5.250 Nabla Bio
- 5.251 Nafigate Corporation a.s.
- 5.252 NatPol
- 5.253 NatureWorks LLC
- 5.254 Nereid Biomaterials
- 5.255 NefFa
- 5.256 Newlight Technologies LLC
- 5.257 Ningbo Tianan Biologic Material
- 5.258 Noetik
- 5.259 Nobias Therapeutics
- 5.260 NoPalm Ingredients
- 5.261 Nosh.bio
- 5.262 Notpla
- 5.263 Nourish
- 5.264 Novomer
- 5.265 Novozymes A/S
- 5.266 Novo Nordisk
- 5.267 Nucleai
- 5.268 NVIDIA
- 5.269 Oakbio, Inc.
- 5.270 Octarine Bio
- 5.271 Odyssey Therapeutics
- 5.272 one five
- 5.273 Onego Bio
- 5.274 Oimo

- 5.275 Orbital Materials
- 5.276 Ordaos Bio
- 5.277 Origin by Ocean
- 5.278 Owkin
- 5.279 Paques Biomaterials
- 5.280 Pearl Bio
- 5.281 Perfect Day
- 5.282 Perpetual Medicines
- 5.283 PHABuilder
- 5.284 Photanol B.V.
- 5.285 Phylloceuticals
- 5.286 Phytolon
- 5.287 Pili
- 5.288 Pivot Materials LLC
- 5.289 Plastus
- 5.290 Pneuma Bio
- 5.291 Polaris Quantum Biotech (POLARISqb)
- 5.292 PoLoPo
- 5.293 Polybion
- 5.294 Polyferm
- 5.295 Pow.bio
- 5.296 Precigen, Inc.
- 5.297 PredxBio
- 5.298 Profluent Bio
- 5.299 Prokarium
- 5.300 Prometheus Materials
- 5.301 ProPhase Labs
- 5.302 ProteinQure
- 5.303 Protein Evolution
- 5.304 Provectus Algae
- 5.305 Praj Industries Ltd.
- 5.306 Quazy Foods
- 5.307 QuantHealth
- 5.308 Q-milk GmbH
- 5.309 Recursion Pharmaceuticals
- 5.310 Relay Therapeutics
- 5.311 Ribbon Biolabs
- 5.312 Roche
- 5.313 Roivant Sciences

- 5.314 Roquette S.A.
- 5.315 RWDC
- 5.316 Samsara Eco Pty Ltd.
- 5.317 Sanofi
- 5.318 Saphium Biotechnology GMBH
- 5.319 Scindo
- 5.320 ScobyTec GmbH
- 5.321 Schrodinger
- 5.322 Seismic Therapeutic
- 5.323 Seawear Ltd.
- 5.324 Seevix Material Sciences Ltd.
- 5.325 Sekab E-Technology AB
- 5.326 Seminal Biosciences
- 5.327 Sensible Biotechnologies
- 5.328 SeQure Dx
- 5.329 SimBioSys
- 5.330 Smartfiber AG
- 5.331 SNIPR Biome
- 5.332 Solar Foods Oy
- 5.333 Soma Bioworks/White Lemur Co.
- 5.334 Solugen
- 5.335 Sphere Fluidics Limited
- 5.336 Spiber, Inc.
- 5.337 Spidey Tek
- 5.338 Spinnova Oy
- 5.339 St1 Oy
- 5.340 Superluminal Medicines
- 5.341 SUPLA Bioplastics
- 5.342 SWAY
- 5.343 Synlogic
- 5.344 Synthego
- 5.345 T-Cypher Bio
- 5.346 Teal Bioworks, Inc.
- 5.347 Telesis Bio
- 5.348 Ten63 Therapeutics
- 5.349 Terray Therapeutics
- 5.350 Terra Bioindustries
- 5.351 Teysha Technologies Limited
- 5.352 thyssenkrupp Industrial Solutions AG

- 5.353 Tianjin GreenBio Materials Co., Ltd
- 5.354 Total Corbion
- 5.355 Touchlight Gene
- 5.356 TRexBio
- 5.357 Treemera GmbH
- 5.358 TripleW
- 5.359 Twist Bioscience
- 5.360 Uluu
- 5.361 UPM Biochemicals
- 5.362 Valo Health
- 5.363 VantAI
- 5.364 Van Heron Labs
- 5.365 VEnvirotech Biotechnology SL
- 5.366 Versalis SpA
- 5.367 Verge Genomics
- 5.368 Vertus Energy Ltd.
- 5.369 Virent Inc.
- 5.370 Viridos, Inc.
- 5.371 Visolis, Inc.
- 5.372 Wild Microbes
- 5.373 WNWN Food Labs
- 5.374 Xaira Therapeutics
- 5.375 Xtalpi
- 5.376 Yali Bio
- 5.377 Yield10 Bioscience, Inc.
- 5.378 Yoneda Labs
- 5.379 Zayt Bioscience
- 5.380 Zephyr AI
- 5.381 Zero Acre Farms
- 5.382 Zya Enzymes

6 GLOSSARY

- 6.1 Acronyms
- 6.2 Terms

7 REFERENCES

List Of Tables

LIST OF TABLES

- Table 1. Biotechnology "colours".
- Table 2. Differences between white biotechnology and conventional processes.
- Table 3. Application areas for white biotechnology.
- Table 4. Advantages of white biotechnology.
- Table 5. Routes for carbon capture in white biotechnology.
- Table 6. Molecules produced through industrial biomanufacturing.
- Table 7. Commonly used bacterial hosts for white biotechnology production.
- Table 8. Commonly used yeast hosts for white biotech production.
- Table 9. Examples of fungal hosts used in white biotechnology processes.
- Table 10. Examples of marine organisms as hosts for white biotechnology applications.
- Table 11. Common microbial hosts used for enzyme production in white biotechnology.
- Table 12. Photosynthetic microorganisms used as production hosts in white biotechnology
- Table 13. Biomanufacturing processes utilized in white biotechnology.
- Table 14. Continuous vs batch biomanufacturing
- Table 15. Key fermentation parameters in batch vs continuous biomanufacturing processes.
- Table 16. Major microbial cell factories used in industrial biomanufacturing.
- Table 17. Core stages - Design, Build and Test.
- Table 18. Products and applications enabled by synthetic biology.
- Table 19. Engineered proteins in industrial applications.
- Table 20. Cell-free versus cell-based systems
- Table 21. White biotechnology fermentation processes.
- Table 22. Products from C1 feedstocks in white biotechnology.
- Table 23. C2 Feedstock Products.
- Table 24. CO₂ derived products via biological conversion-applications, advantages and disadvantages.
- Table 25. Production capacities of biorefinery lignin producers.
- Table 26. Common starch sources that can be used as feedstocks for producing biochemicals.
- Table 27. Biomass processes summary, process description and TRL.
- Table 28. Pathways for hydrogen production from biomass.
- Table 29. Overview of alginate-description, properties, application and market size.
- Table 30. Blue biotechnology companies.
- Table 31. Market trends and drivers in white biotechnology.

- Table 32. Industry challenges and restraints in white biotechnology.
- Table 33. White biotechnology key application sectors and products.
- Table 34. Comparison of biofuels.
- Table 35. Categories and examples of solid biofuel.
- Table 36. Comparison of biofuels and e-fuels to fossil and electricity.
- Table 37. Classification of biomass feedstock.
- Table 38. Biorefinery feedstocks.
- Table 39. Feedstock conversion pathways.
- Table 40. First-Generation Feedstocks.
- Table 41. Lignocellulosic ethanol plants and capacities.
- Table 42. Comparison of pulping and biorefinery lignins.
- Table 43. Commercial and pre-commercial biorefinery lignin production facilities and processes
- Table 44. Operating and planned lignocellulosic biorefineries and industrial flue gas-to-ethanol.
- Table 45. Properties of microalgae and macroalgae.
- Table 46. Yield of algae and other biodiesel crops.
- Table 47. Processes in bioethanol production.
- Table 48. Microorganisms used in CBP for ethanol production from biomass lignocellulosic.
- Table 49. Biodiesel by generation.
- Table 50. Biodiesel production techniques.
- Table 51. Biofuel production cost from the biomass pyrolysis process.
- Table 52. Biogas feedstocks.
- Table 53. Advantages and disadvantages of Bio-aviation fuel.
- Table 54. Production pathways for Bio-aviation fuel.
- Table 55. Current and announced Bio-aviation fuel facilities and capacities.
- Table 56. Algae-derived biofuel producers.
- Table 57. Markets and applications for biohydrogen.
- Table 58. Comparison of different Bio-H₂ production pathways.
- Table 59. Properties of petrol and biobutanol.
- Table 60. Comparison of biogas, biomethane and natural gas.
- Table 61. Applications of bio-based caprolactam.
- Table 62. Applications of bio-based acrylic acid.
- Table 63. Applications of bio-based 1,4-Butanediol (BDO).
- Table 64. Applications of bio-based ethylene.
- Table 65. Biobased feedstock sources for 3-HP.
- Table 66. Applications of 3-HP.
- Table 67. Applications of bio-based 1,3-Propanediol (1,3-PDO).

- Table 68. Biobased feedstock sources for itaconic acid.
- Table 69. Applications of bio-based itaconic acid.
- Table 70. Biobased feedstocks that can be used to produce 1,5-diaminopentane (DA5).
- Table 71. Applications of DN5.
- Table 72. Applications of bio-based Tetrahydrofuran (THF).
- Table 73. Markets and applications for malonic acid.
- Table 74. Biobased feedstock sources for MEG.
- Table 75. Applications of bio-based MEG.
- Table 76. Applications of bio-based propylene.
- Table 77. Biobased feedstock sources for Succinic acid.
- Table 78. Applications of succinic acid.
- Table 79. Bioplastics and bioplastic precursors synthesized via white biotechnology processes .
- Table 80. Polylactic acid (PLA) market analysis-manufacture, advantages, disadvantages and applications.
- Table 81. PLA producers and production capacities.
- Table 82. Types of PHAs and properties.
- Table 83. Comparison of the physical properties of different PHAs with conventional petroleum-based polymers.
- Table 84. Polyhydroxyalkanoate (PHA) extraction methods.
- Table 85. Commercially available PHAs.
- Table 86. Types of protein based-bioplastics, applications and companies.
- Table 87. Applications of white biotechnology in bioremediation and environmental remediation.
- Table 88. Companies developing fermentation-derived food.
- Table 89. Biofertilizer companies.
- Table 90. Biopesticides companies.
- Table 91. Biostimulants companies.
- Table 92. Crop biotechnology companies.
- Table 93. White biotechnology applications in consumer goods.
- Table 94. Pharmaceutical applications of white biotechnology.
- Table 95. Applications of white biotechnology in the cosmetics industry.
- Table 96. Sustainable biomanufacturing of surfactants and detergents.
- Table 97. Global revenues for white biotechnology, by market, 2018-2035 (Billion USD).
- Table 98. Global revenues for white biotechnology, by region, 2018-2035 (Billion USD).
- Table 99. White biotechnology Glossary of Acronyms.
- Table 100. White biotechnology Glossary of Terms.

List Of Figures

LIST OF FIGURES

- Figure 1. CRISPR/Cas9 & Targeted Genome Editing.
- Figure 2. Genetic Circuit-Assisted Smart Microbial Engineering.
- Figure 3. Cell-free and cell-based protein synthesis systems.
- Figure 4. Microbial Chassis Development for Natural Product Biosynthesis.
- Figure 5. The design-make-test-learn loop of generative biology.
- Figure 6. LanzaTech gas-fermentation process.
- Figure 7. Schematic of biological CO₂ conversion into e-fuels.
- Figure 8. Overview of biogas utilization.
- Figure 9. Biogas and biomethane pathways.
- Figure 10. Schematic overview of anaerobic digestion process for biomethane production.
- Figure 11. BLOOM masterbatch from Algix.
- Figure 12. SWOT analysis: white biotechnology.
- Figure 13. Market map: white biotechnology.
- Figure 14. Biofuels market supply chain.
- Figure 15. Schematic of a biorefinery for production of carriers and chemicals.
- Figure 16. Hydrolytic lignin powder.
- Figure 17. Range of biomass cost by feedstock type.
- Figure 18. Overview of biogas utilization.
- Figure 19. Biogas and biomethane pathways.
- Figure 20. Schematic overview of anaerobic digestion process for biomethane production.
- Figure 21. Algal biomass conversion process for biofuel production.
- Figure 22. Pathways for algal biomass conversion to biofuels.
- Figure 23. Biobutanol production route.
- Figure 24. Renewable Methanol Production Processes from Different Feedstocks.
- Figure 25. Production of biomethane through anaerobic digestion and upgrading.
- Figure 26. Production of biomethane through biomass gasification and methanation.
- Figure 27. Production of biomethane through the Power to methane process.
- Figure 28. Bio-based chemicals market supply chain.
- Figure 29. Overview of Toray process.
- Figure 30. Bacterial nanocellulose shapes
- Figure 31. Bioplastics and biopolymers market supply chain.
- Figure 32. PHA family.
- Figure 33. Food and Nutraceutical Ingredients market supply chain.

- Figure 34. Agricultural biotechnology market supply chain.
- Figure 35. Bio-textiles market supply chain.
- Figure 36. AlgiKicks sneaker, made with the Algiknit biopolymer gel.
- Figure 37. Biobased consumer goods market supply chain.
- Figure 38. Biopharmaceuticals market supply chain.
- Figure 39. Biobased cosmetics market supply chain.
- Figure 40. Surfactants and detergents market supply chain.
- Figure 41. Biobased construction materials market supply chain.
- Figure 42. BioMason cement.
- Figure 43. Microalgae based biocement masonry bloc.
- Figure 44. Typical structure of mycelium-based foam.
- Figure 45. Commercial mycelium composite construction materials.
- Figure 46. Global revenues for white biotechnology, by market, 2018-2035 (Billion USD).
- Figure 47. Global revenues for white biotechnology, by region, 2018-2035 (Billion USD).
- Figure 48. Algiknit yarn.
- Figure 49. ALGIECEL PhotoBioReactor.
- Figure 50. Jelly-like seaweed-based nanocellulose hydrogel.
- Figure 51. BIOLO e-commerce mailer bag made from PHA.
- Figure 52. Domsjo process.
- Figure 53. Mushroom leather.
- Figure 54. PHA production process.
- Figure 50. Light Bio Bioluminescent plants.
- Figure 55. Lignin gel.
- Figure 56. BioFlex process.
- Figure 57. TransLeather.
- Figure 58. Reishi.
- Figure 59. Compostable water pod.
- Figure 60. Precision Photosynthesis technology.
- Figure 61. Enfinity cellulosic ethanol technology process.
- Figure 62. Fabric consisting of 70 per cent wool and 30 per cent Qmilk.
- Figure 63. Lyocell process.
- Figure 64. Spider silk production.
- Figure 65. Corbion FDCA production process.
- Figure 66. UPM biorefinery process.
- Figure 67. The Proesa Process.
- Figure 68. XtalPi s automated and robot-run workstations.

I would like to order

Product name: The Global Market for White (Industrial) Biotechnology 2024-2035

Product link: <https://marketpublishers.com/r/GF1E99C28595EN.html>

Price: US\$ 1,450.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/GF1E99C28595EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:
Last name:
Email:
Company:
Address:
City:
Zip code:
Country:
Tel:
Fax:
Your message:

****All fields are required**

Customer signature _____

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970