



# Single Use Technology

*For Biopharmaceuticals:  
Global Markets*

June 2017

***Shalini S. Dewan***

Report Code: BIO099C

# Table of Contents

<b>Chapter 1: Introduction</b> .....	<b>1</b>
Study Goals and Objectives.....	1
Reasons for Doing This Study.....	1
Intended Audience.....	2
Scope of Report.....	2
Information Sources.....	2
Methodology.....	2
Geographic Breakdown.....	3
Analyst's Credentials.....	5
Related BCC Research Reports.....	5
<b>Chapter 2: Summary and Highlights</b> .....	<b>7</b>
<b>Chapter 3: Overview</b> .....	<b>10</b>
Definitions.....	10
Antibodies .....	10
Biopharmaceutical.....	10
Bioprocess .....	10
Bioreactor.....	10
Depth Filters .....	10
Disposables.....	10
Downstream Processing.....	10
Monoclonal Antibodies .....	10
Polyclonal Antibodies .....	11
Single-Use Technology .....	11
Tangential Flow Filtration.....	11
Upstream Processing.....	11
Vaccine .....	11
Manufacturing Process for Biopharmaceuticals.....	11
Bioprocessing .....	12
Formulation and Filling.....	13
Single-use Technology (SUT).....	13
History of Single-use Technology.....	14
Single-use Technology Vs. Traditional Reusable Technology in Biopharmaceutical Manufacturing .....	15
Types of Single-use Technology Products Used in the Biopharmaceutical Industry .....	16
Single-use Bioreactors.....	17
Membrane Adsorbers .....	18
Disposable Mixing Systems .....	18
Tangential Flow Filtration (TFF).....	19
Tubing and Connectors .....	20
Depth Filtration .....	20
Bioprocess Containers.....	21
Samplers.....	22
Media Bags and Filter Cartridges .....	22
Other Single-use Technologies.....	23
Primary Applications of Single-use Technology.....	23
Advantages and Disadvantages of Single-use Technologies.....	24

Advantages .....	24
Disadvantages .....	25
Global Manufacturers of Single-use Systems .....	26
<b>Chapter 4: Regulations and New Developments .....</b>	<b>29</b>
Regulatory Aspects for Single-use Technology .....	29
New Products and Developments .....	31
Mergers and Acquisitions .....	34
Awards for Single-Use Products.....	36
<b>Chapter 5: Market Analysis .....</b>	<b>39</b>
Market by Type .....	40
Market Overview.....	40
Market Revenue .....	41
Market Share.....	44
Market by Region.....	45
Market Overview.....	46
Market Revenue .....	47
Market Share.....	48
Single-use Bioreactors.....	49
Membrane Adsorbers .....	52
Media Bags .....	54
Tubing and Connectors .....	56
Bioprocess Containers.....	58
Disposable Mixing Systems .....	60
Samplers.....	62
Filter Cartridges.....	64
Depth Filtration .....	67
Tangential Flow Filtration.....	69
Other Single-use Products.....	72
<b>Chapter 6: Industry Structure .....</b>	<b>75</b>
Single-use Bioreactors.....	75
Market Leaders .....	75
Market Share.....	76
Membrane Adsorbers .....	77
MEDIA BAGS.....	79
Tubing and Connectors .....	81
Bioprocess Containers.....	84
DISPOSABLE MIXING SYSTEMS.....	85
Samplers.....	87
Disposable Filter Cartridges .....	89
Depth Filtration Systems .....	91
Tangential Flow Filtration Systems .....	93
Other Single-use Products.....	94
<b>Chapter 7: Market by Applications and End Users .....</b>	<b>98</b>
Global Market for Single-use Technology by Application.....	99
Market Overview.....	99
Market Revenue .....	100
Market Share.....	101
Single-use Technology Used for Manufacture of Monoclonal Antibodies .....	103

Market Overview.....	103
Market Revenue.....	104
Single-use Technology Used for Manufacture of Vaccines.....	107
Market Overview.....	107
Market Revenue.....	108
Single-use Technology Used for the Manufacture of Blood Derivatives.....	111
Market Overview.....	111
Market Revenue.....	111
Single-use Technology Used for the Manufacture of Anti-Cancer Drugs.....	114
Market Overview.....	114
Market Revenue.....	115
Single-use Technology Used for the Manufacture of Recombinant Proteins.....	116
Market Overview.....	117
Market Revenue.....	118
Single-use Technology Used for the Manufacture of Gene Therapy Drugs.....	120
Market Overview.....	120
Market Revenue.....	121
Single-use Technology Used for Manufacture of Stem Cell and Other Cell Therapies.....	124
Market Overview.....	124
Market Revenue.....	125
Global Market for Single-use Technology by End Users.....	127
Biopharmaceutical Manufacturer.....	127
Contract Manufacturing Organizations.....	127
Market Overview.....	128
Market Revenue.....	128
Market Share.....	130
Contract Manufacturing Organizations.....	131
Market Overview.....	131
Market Revenue.....	132
Biopharmaceutical Manufacturers.....	135
Market Overview.....	135
Market Revenue.....	135
<b>Chapter 8: Patent Analysis.....</b>	<b>139</b>
Patents by Year.....	139
Patents by Type.....	140
Patents by Company.....	141
Patents by Country.....	143
Patents by Assignee.....	145
<b>Chapter 9: Current Situation.....</b>	<b>148</b>
Factors Affecting Single-use Technology.....	148
Drivers of Single-use Technology.....	148
Current Challenges for the Single-use Product Market.....	150
<b>Chapter 10: Company Profiles.....</b>	<b>153</b>
<b>Appendix Abbreviations.....</b>	<b>171</b>
<b>Appendix: Abbreviations.....</b>	<b>172</b>
<b>About BCC Research.....</b>	<b>174</b>

About BCC Research.....	175
BCC Membership .....	175
BCC Custom Research .....	175

# List of Tables

Summary Table: Global Market for Single-Use Technology, by Region, Through 2021 (\$ Millions).....	8
Table 1 Evolution of Single-use Technologies Used in Biopharmaceutical Manufacturing.....	15
Table 2 Traditional Reusable Technology Vs. Single-use Technologies.....	16
Table 3 Global Manufacturers of Single-use Systems.....	26
Table 4 Organizations Developing Standards .....	31
Table 5 New Developments for Single-use Technology Products, 2014-2016 .....	32
Table 6 Mergers and Acquisitions of Single-use Technology Companies, 2014-2016 .....	35
Table 7 Awards for Single-use Technology Products, 2014-2016.....	37
Table 8 Global Market for Single-use Technology, by Type, Through 2021 (\$ Millions) .....	42
Table 9 Market Share of Single-use Technologies, by Type, 2015 (%).....	44
Table 10 Global Market for Single-use Technology, by Region, Through 2021 (\$ Millions).....	47
Table 11 Market Share of Single-use Technology, by Region, 2015 (%).....	48
Table 12 Global Market for Single-use Bioreactors, by Region, Through 2021 (\$ Millions).....	51
Table 13 Global Market for Membrane Adsorbers, by Region, Through 2021 (\$ Millions) .....	53
Table 14 Global Market for Media Bags, by Region, Through 2021 (\$ Millions).....	55
Table 15 Global Market for Tubing and Connectors, by Region, Through 2021 (\$ Millions) .....	57
Table 16 Global Market for Bioprocess Containers, by Region, Through 2021 (\$ Millions).....	60
Table 17 Global Market for Disposable Mixing Systems, by Region, Through 2021 (\$ Millions) .....	62
Table 18 Global Market for Disposable Samplers, by Region, Through 2021 (\$ Millions) .....	64
Table 19 Global Market for Disposable Filter Cartridges, by Region, Through 2021 (\$ Millions) .....	66
Table 20 Global Market for Disposable Depth Filtration Systems, by Region, Through 2021 (\$ Millions) .....	68
Table 21 Global Market for Disposable Tangential Flow Filtration Systems, by Region, Through 2021 (\$ Millions) .....	71
Table 22 Global Market for Other Single-use Technologies, by Region, Through 2021 (\$ Millions).....	73
Table 23 Leading Manufacturers and Suppliers of Single-use Bioreactors, 2015.....	75
Table 24 Market Share for Manufacturers and Suppliers of Single-use Bioreactors, 2015 (%) .....	76
Table 25 Leading Manufacturers and Suppliers of Single-use Membrane Adsorbers, 2015.....	78
Table 26 Market Share for Manufacturers and Suppliers of Single-use Membrane Adsorbers, 2015 (%) .....	78
Table 27 Leading Manufacturers and Suppliers of Single-use Media Bags, 2015 .....	79
Table 28 Market Share for Manufacturers and Suppliers of Single-use Media Bags, 2015 (%).....	80
Table 29 Leading Manufacturers and Suppliers of Single-use Tubing and Connectors, 2015.....	81
Table 30 Market Share for Manufacturers and Suppliers of Single-use Tubing and Connectors, 2015 (%) .....	83
Table 31 Leading Manufacturers and Suppliers of Single-use Bioprocess Containers, 2015 .....	84
Table 32 Market Share for Manufacturers and Suppliers of Single-use Bioprocess Containers, 2015 (%) .....	84
Table 33 Leading Manufacturers and Suppliers of Single-use Mixing Systems, 2015 .....	86
Table 34 Market Share for Manufacturers and Suppliers of Single-use Mixing Systems, 2015 (%).....	86
Table 35 Leading Manufacturers and Suppliers of Single-use Sampling Systems, 2015 .....	88
Table 36 Market Share for Manufacturers and Suppliers of Single-use Sampling Systems, 2015 (%).....	88
Table 37 Leading Manufacturers and Suppliers of Single-use Filter Cartridges, 2015 .....	90
Table 38 Market Share for Manufacturers and Suppliers of Single-use Filter Cartridges, 2015 (%).....	90
Table 39 Leading Manufacturers and Suppliers of Single-use Depth Filtration Systems, 2015 .....	91
Table 40 Market Share of Manufacturers and Suppliers of Single-use Depth Filtration Systems, 2015 (%) .....	92
Table 41 Leading Manufacturers and Suppliers of Single-use TFF Systems, 2015 .....	93
Table 42 Market Share for Manufacturers and Suppliers of Single-use TFF Systems, 2015 (%) .....	93
Table 43 Leading Manufacturers and Suppliers of Single-use Products, 2015.....	94

Table 44 Market Share of Manufacturers and Suppliers of Other Single-use Products, 2015 (%).....	95
Table 45 Global Market for Single-use Technology, by Application, Through 2021 (\$ Millions) .....	100
Table 46 Market Share for Single-use Technology, by Application, 2015 (%) .....	102
Table 47 Global Market for Single-use Technology Used in the Production of Monoclonal Antibodies, by Type, Through 2021 (\$ Millions) .....	105
Table 48 Global Market for Single-use Technology Used in the Production of Vaccines, by Type, Through 2021 (\$ Millions) .....	109
Table 49 Global Market for Single-use Technology Used in the Production of Blood Derivatives, by Type, Through 2021 (\$ Millions).....	112
Table 50 Global Market for Single-use Technology Used in the Production of Anticancer Drugs, by Type, Through 2021 (\$ Millions).....	115
Table 51 Global Market for Single-use Technology Used in the Production of Recombinant Proteins, by Type, Through 2021 (\$ Millions) .....	118
Table 52 Global Market for Single-use Technology Used in the Production of Gene Therapy, by Type, Through 2021 (\$ Millions).....	122
Table 53 Global Market for Single-use Technology Used in the Production of Stem Cell and Other Cell Therapies, by Type, Through 2021 (\$ Millions).....	125
Table 54 Global Market for Single-use Technologies Used in the Manufacture of Biopharmaceuticals, by End User, Through 2021 (\$ Millions) .....	129
Table 55 Market Share of Single-use Technology, by End User, 2015 (%) .....	130
Table 56 Global Market for Single-use Technology Used by Biopharmaceutical CMOs, by Type, Through 2021 (\$ Millions) .....	133
Table 57 Global Market for Single-use Technology Used by Biopharmaceutical Manufacturers, by Type, Through 2021 (\$ Millions).....	136
Table 58 Number of Patents, by Year, 2014-2016.....	140
Table 59 Number of Patents, by Type, 2014-2016 .....	140
Table 60 Number of Patents, by Company, 2014-2016.....	142
Table 61 Number of Patents, by Country, 2014-2016 .....	143
Table 62 Patent Shares, by Country, 2014-2016 (No./%) .....	144
Table 63 Number of Patents, by Assignee Type, 2014-2016 .....	145

# List of Figures

Summary Figure: Global Market for Single-Use Technology, by Region, 2014-2021 (\$ Millions).....	8
Figure 1 Global Market for Single-use Technology, by Type, 2014-2021 (\$ Millions).....	43
Figure 2 Market Share of Single-use Technologies, by Type, 2015 (%).....	45
Figure 3 Global Market for Single-use Technology, by Region, 2014-2021 (\$ Millions).....	48
Figure 4 Market Share of Single-use Technology, by Region, 2015 (%).....	49
Figure 5 Global Market for Single-use Bioreactors, by Region, 2014-2021 (\$ Millions).....	52
Figure 6 Global Market for Membrane Adsorbers, by Region, 2014-2021 (\$ Millions).....	54
Figure 7 Global Market for Media Bags, by Region, 2014-2021 (\$ Millions).....	56
Figure 8 Global Market for Tubing and Connectors, by Region, 2014-2021 (\$ Millions).....	58
Figure 9 Global Market for Bioprocess Containers, by Region, 2014-2021 (\$ Millions).....	60
Figure 10 Global Market for Disposable Mixing Systems, by Region, 2014-2021 (\$ Millions).....	62
Figure 11 Global Market for Disposable Samplers, by Region, 2014-2021 (\$ Millions).....	64
Figure 12 Global Market for Disposable Filter Cartridges, by Region, 2014-2021 (\$ Millions).....	66
Figure 13 Global Market for Disposable Depth Filtration Systems, by Region, 2014-2021 (\$ Millions)....	69
Figure 14 Global Market for Disposable Tangential Flow Filtration Systems, by Region, 2014-2021 (\$ Millions).....	71
Figure 15 Global Market for Other Single-use Technologies, by Region, 2014-2021 (\$ Millions).....	73
Figure 16 Market Share for Manufacturers and Suppliers of Single-use Bioreactors, 2015 (%).....	77
Figure 17 Market Share for Manufacturers and Suppliers of Single-use Membrane Adsorbers, 2015 (%).....	79
Figure 18 Market Share for Manufacturers and Suppliers of Single-use Media Bags, 2015 (%).....	81
Figure 19 Market Share for Manufacturers and Suppliers of Single-use Tubing and Connectors, 2015 (%).....	83
Figure 20 Market Share for Manufacturers and Suppliers of Single-Use Bioprocess Containers, 2015 (%).....	85
Figure 21 Market Share for Manufacturers and Suppliers of Single-use Mixing Systems, 2015 (%).....	87
Figure 22 Market Share for Manufacturers and Suppliers of Single-use Sampling Systems, 2015 (%).....	89
Figure 23 Market Share for Manufacturers and Suppliers of Single-use Filter Cartridges, 2015 (%).....	91
Figure 24 Market Share of Manufacturers and Suppliers of Single-use Depth Filtration Systems, 2015 (%).....	92
Figure 25 Market Share for Manufacturers and Suppliers of Single-use TFF Systems, 2015 (%).....	94
Figure 26 Market Share for Manufacturers and Suppliers of Other Single-use Products, 2015 (%).....	96
Figure 27 Global Market for Single-use Technology, by Application, 2014-2021 (\$ Millions).....	101
Figure 28 Market Share for Single-use Technology, by Application, 2015 (%).....	102
Figure 29 Global Market for Single-use Technology Used in the Production of Monoclonal Antibodies, by Type, 2014-2021 (\$ Millions).....	106
Figure 30 Global Market for Single-Use Technology Used in the Production of Vaccines, by Type, 2014-2021 (\$ Millions).....	110
Figure 31 Global Market for Single-use Technology Used in the Production of Blood Derivatives, by Type, 2014-2021 (\$ Millions).....	113
Figure 32 Global Market for Single-use Technology Used in the Production of Anti-Cancer Drugs, by Type, 2014-2021 (\$ Millions).....	116
Figure 33 Global Market for Single-use Technology Used in the Production of Recombinant Proteins, by Type, 2014-2021 (\$ Millions).....	119
Figure 34 Global Market for Single-use Technology Used in the Production of Gene Therapy, by Type, 2014-2021 (\$ Millions).....	123
Figure 35 Global Market for Single-use Technology Used in the Production of Stem Cell and Other Cell Therapies, by Type, 2014-2021 (\$ Millions).....	126



Figure 36 Global Market for Single-use Technologies Used in the Manufacture of Biopharmaceuticals, by End User, 2014-2021 (\$ Millions).....	130
Figure 37 Market Share of Single-use Technology, by End User, 2015 (%) .....	131
Figure 38 Global Market for Single-use Technology Used by Biopharmaceutical CMOs, by Type, 2014-2021 (\$ Millions) .....	134
Figure 39 Global Market for Single-use Technology Used by Biopharmaceutical Manufacturers, by Type, 2014-2021 (\$ Millions) .....	137
Figure 40 Number of Patents, by Year, 2014-2016.....	140
Figure 41 Number of Patents, by Type, 2014-2016 .....	141
Figure 42 Number of Patents, by Country, 2014-2016.....	144
Figure 43 Patent Shares, by Country, 2014-2016 (No./%).....	145
Figure 44 Number of Patents, by Assignee Type, 2014-2016.....	146



*About BCC Research*

## *About BCC Research*

With our unparalleled 45-year history, BCC Research provides comprehensive analysis of global market sizing, forecasting and industry intelligence, covering markets where advances in science and technology are improving the quality, standard and sustainability of businesses, economies and lives.

## *BCC Membership*

From market sizing and forecasts, to opportunity assessments and competitive analyses, our ever-expanding library gives you the data, insights and intelligence required to ensure your project is a success. Members benefit from ongoing, unlimited access to the category or collections of their choice, and most membership packages pay for themselves within two to three reports being accessed.

Did you buy this report? You may qualify to apply your purchase price towards a full membership. Call 866-285-7215 or email <mailto:info@bccresearch.com> to request a demo.

## *BCC Custom Research*

Our experts provide custom research projects to those working to identify new markets, introduce new products, validate existing market share, analyze competition and assess the potential for products to impact existing markets. With impressive academic credentials and broad and deep knowledge of global industrial markets, our independent analysts and consultants develop the facts, figures, analysis and assessments to inform the decisions that will move your company ahead. Confidential inquiries to: [custom@bccresearch.com](mailto:custom@bccresearch.com) or 781-205-2429.

## DISCLAIMER

The information developed in this report is intended to be as reliable as possible at the time of publication and is of a professional nature. This information does not constitute managerial, legal or accounting advice, nor should it be considered as a corporate policy guide, laboratory manual or an endorsement of any product, as much of the information is speculative in nature. BCC Research and the author assume no responsibility for any loss or damage that might result from reliance on the reported information or from its use.

ISBN: 1-62296-495-0  
June 2017