

INTRODUCTION	xiii
STUDY GOAL AND OBJECTIVES	xiii
REASONS FOR DOING THE STUDY	xiii
INTENDED AUDIENCE.....	xiii
SCOPE OF REPORT	xiv
INFORMATION SOURCES.....	xiv
ANALYST'S CREDENTIALS.....	xv
RELATED BCC REPORTS	xv
BCC ONLINE SERVICES.....	xv
DISCLAIMER	xv
SUMMARY.....	xvi
<i>SUMMARY TABLE U.S. MARKET FORECAST FOR BIOCOMPATIBLE</i>	
<i>MATERIALS BY SEGMENT, THROUGH 2012 (\$ MILLIONS)</i>	XVI
<i>SUMMARY FIGURE U.S. MARKET FOR BIOCOMPATIBLE</i>	
<i>MATERIALS, BY SEGMENT 2004-2012 (\$ MILLIONS)</i>	XVII
OVERVIEW	1
INTRODUCTION TO BIOCOMPATIBLE MATERIALS	1
TYPES OF MATERIALS	1
CERAMICS.....	1
Ceramics (Continued).....	2
<i>TABLE 1 COMMON BIOCOMPATIBLE CERAMICS</i>	3
METALS	3
Titanium	4
Gold	4
Platinum	4
<i>TABLE 2 COMMON BIOCOMPATIBLE METALS</i>	5
POLYMERS	5
PLA and PGA.....	6
PTFE	6
<i>TABLE 3 COMMON BIOCOMPATIBLE POLYMERES</i>	7
Natural Materials	7
Collagen	8
Chitosan	8
Alginate.....	9
<i>TABLE 4 COMMON BIOCOMPATIBLE NATURAL MATERIALS</i>	9
TECHNOLOGY	10
ADVANCES IN BIOACTIVE MATERIALS	10
GROWTH FACTORS	10
DRUG-ELUTING SURFACES.....	11
HYDROGELS	11
Hydrogels for Growth Factor Delivery	12

Mechanoresponsive Hydrogels.....	13
Poly(HEMA).....	13
DEGRADABLE OR BIORESORBABLE MATERIALS.....	13
Chitosan.....	14
Polyethylene Oxide.....	14
Ethylene-vinyl Acetate.....	15
THE CHALLENGES OF BIOCOMPATIBILITY.....	15
BLOOD COMPATIBILITY AND PROTEIN ADSORPTION.....	15
Albumin.....	16
Immunoglobulins.....	16
Fibrinogen.....	16
CALCIFICATION.....	17
INFECTION AND BIOFILMS.....	17
HOST IMMUNE RESPONSE.....	18
Wound Healing and Inflammation.....	18
Foreign Body Immune Reaction and Rejection.....	19
Complement Immune Response.....	20
RECENT ADVANCES IN ENABLING TECHNOLOGIES.....	21
BIOMIMETICS.....	21
NANOTECHNOLOGY.....	22
TISSUE ENGINEERING.....	23
STEM CELLS.....	23
BIOREACTOR TECHNOLOGY.....	24
PATENT ANALYSIS.....	25
PATENTS BY TECHNOLOGY.....	25
<i>TABLE 5 BIOCOMPATIBLE MATERIALS, ISSUED PATENTS BY TECHNOLOGY, JANUARY 2006-JANUARY 2007</i>	25
<i>FIGURE 1 BIOCOMPATIBLE MATERIALS, ISSUED PATENTS BY TECHNOLOGY, JANUARY 2006-JANUARY 2007 (%)</i>	26
PATENTS BY MEDICAL APPLICATION.....	26
<i>TABLE 6 BIOCOMPATIBLE MATERIALS, ISSUED PATENTS BY MEDICAL APPLICATION, JANUARY 2006-JANUARY 2007</i>	26
<i>FIGURE 2 BIOCOMPATIBLE MATERIALS, ISSUED PATENTS BY MEDICAL APPLICATION, JANUARY 2006-JANUARY 2007 (%)</i>	27
PATENTS BY REGION/OR COUNTRY (DEPENDING ON DISTRIBUTION).....	27
<i>TABLE 7 BIOCOMPATIBLE MATERIALS, ISSUED PATENTS BY REGION, JANUARY 2006-JANUARY 2007</i>	28
<i>FIGURE 3 BIOCOMPATIBLE MATERIALS, ISSUED PATENTS BY COUNTRY, JANUARY 2006-JANUARY 2007 (%)</i>	28
PATENTS BY ASSIGNEE.....	29
<i>TABLE 8 BIOCOMPATIBLE MATERIALS, ISSUED PATENTS BY ASSIGNEE AFFILIATION, JANUARY 2006-JANUARY 2007</i>	30

<i>FIGURE 4 BIOCOMPATIBLE MATERIALS, ISSUED PATENTS BY ASSIGNEE AFFILIATION, JANUARY 2006-JANUARY 2007 (%)</i>	30
<i>TABLE 9 BIOCOMPATIBLE MATERIALS ISSUED PATENTS BY ASSIGNEE, JANUARY 2006-JANUARY 2007</i>	31
<i>TABLE 9 (CONTINUED)</i>	32
<i>TABLE 9 (CONTINUED)</i>	33
<i>TABLE 9 (CONTINUED)</i>	34
<i>TABLE 9 (CONTINUED)</i>	35
PATENTS OF INTEREST	36
Patent Title: Triggered Release Hydrogel Drug Delivery System	36
Patent Title: Adaptive Memory Prioritization for Implanted Medical Devices.....	36
Patent Title: Coumarin Endcapped Absorbable Polymers	37
Bioabsorbable Polymeric Implants and a Method Of Using The Same to Create Occlusions	37
SPECIAL ISSUES IN CARDIAC STENT PATENTING	38
Special Issues in Cardiac ...(Continued)	39
GOVERNMENT REGULATION	40
FDA REGULATION OF MEDICAL DEVICES.....	40
BIOMATERIALS ACCESS ASSURANCE ACT OF 1998.....	41
REGULATION OF TISSUE ENGINEERED PRODUCTS	42
FDA REGULATION OF GOOD TISSUE PRACTICES	42
GOVERNMENT REGULATION OF NANOMATERIALS	43
NEW FDA APPROVALS	43
Novel Hernia Repair Material	44
Low Pressure Perfusion Catheter.....	44
Real-Time Continuous Glucose Monitor.....	45
Omega-3 Fatty Acid Coated Mesh	45
Wireless Telemetry and Cardiac Rhythm Management Implants.....	46
Wireless Telemetry ... (Continued).....	47
MARKET FOR BIOCOMPATIBLE MATERIALS	48
<i>TABLE 10 U.S. MARKET FORECAST FOR BIOCOMPATIBLE MATERIALS BY SEGMENT, THROUGH 2012 (\$ MILLIONS)</i>	48
IMPLANTABLE MEDICAL DEVICES	48
<i>TABLE 11 U.S. MARKET FORECAST FOR IMPLANTABLE MEDICAL DEVICES BY SEGMENT, THROUGH 2012 (\$ MILLIONS)</i>	49
<i>FIGURE 5 U.S. MARKET FOR IMPLANTABLE MEDICAL DEVICES, BY SEGMENT 2004-2012 (\$ MILLIONS)</i>	50
TISSUE REPLACEMENTS	50
<i>TABLE 12 U.S. MARKET FORECAST FOR TISSUE REPLACEMENTS BY SEGMENT, THROUGH 2012 (\$ MILLIONS)</i>	50

TABLE 12 (CONTINUED).....	51
FIGURE 6 U.S. MARKET FOR TISSUE REPLACEMENTS, BY SEGMENT 2004-2012 (\$ MILLIONS).....	51
SURFACE COATINGS.....	52
TABLE 13 U.S. MARKET FORECAST FOR BIOCOMPATIBLE SURFACE COATINGS BY SEGMENT, THROUGH 2012 (\$ MILLIONS).....	53
FIGURE 7 U.S. MARKET FOR BIOCOMPATIBLE SURFACE COATINGS BY SEGMENT, 2004-2012 (\$ MILLIONS).....	53
SURFACE COATINGS (CONTINUED)	54
U.S. MARKET FOR BIOMATERIALS, BY APPLICATION	55
TABLE 14 U.S. MARKET FORECAST FOR BIOMATERIALS BY APPLICATION, THROUGH 2012 (\$ MILLIONS).....	55
FIGURE 8 U.S. MARKET FOR BIOMATERIALS, BY MEDICAL APPLICATION 2004-2012 (\$ MILLIONS).....	55
ORTHOPEDIC APPLICATIONS	56
TABLE 15 U.S. MARKET FOR ORTHOPEDIC BIOMATERIALS, BY SEGMENT THROUGH 2012 (\$ MILLIONS)	56
FIGURE 9 U.S. MARKET FOR ORTHOPEDIC BIOMATERIALS, BY SEGMENT, 2004-2012 (\$ MILLIONS).....	57
BONE-PLATE MATERIALS	57
Bone-Plate Materials (Continued)	58
HIP REPLACEMENTS.....	59
Hip Resurfacing	60
KNEE REPLACEMENTS.....	61
Non-constrained Implants.....	62
Semi-constrained Implants	62
Constraint or Hinged Implants.....	62
Unicondylar Knee Replacement.....	62
SPINAL IMPLANTS	63
Types of Spinal Implants	64
Disc Arthroplasty.....	64
THE MARKET FOR ORTHOPEDIC BIOMATERIALS.....	65
CARDIOVASCULAR APPLICATIONS	66
TABLE 16 U.S. MARKET FORECAST FOR CARDIOVASCULAR BIOMATERIALS BY SEGMENT, THROUGH 2012 (\$ MILLIONS)	66
CARDIAC PACEMAKERS	66
IMPLANTABLE CARDIOVERTER DEFIBRILLATORS.....	67
Implantable Cardioverter ... (Continued)	68
CARDIAC STENTS.....	69
Metal Stents.....	69
Drug-Eluting Stents (DES)	69
Rapamycin and Related Immunosuppressants.....	70
Paclitaxel.....	70

Drug-Eluting Stents And Complications.....	70
HEART VALVES.....	71
Percutaneous Implant	72
VASCULAR ACCESS DEVICES.....	72
Midline Catheter	73
Peripherally Inserted Central Catheter (PICC).....	73
Tunneled Catheter.....	74
Subcutaneous Port.....	74
PERIPHERAL VASCULAR GRAFTS.....	74
<i>FIGURE 10 U.S. MARKET FOR CARDIOVASCULAR BIOMATERIALS,</i>	
<i>BY SEGMENT 2004-2012 (\$ MILLIONS).....</i>	<i>75</i>
WOUND MANAGEMENT APPLICATIONS	75
<i>TABLE 17 U.S. MARKET FORECAST FOR WOUND MANAGEMENT</i>	
<i>BIOMATERIALS BY SEGMENT, THROUGH 2012 (\$ MILLIONS)</i>	<i>76</i>
<i>FIGURE 11 U.S. MARKET FOR WOUND MANAGEMENT</i>	
<i>BIOMATERIALS BY SEGMENT, 2004-2012 (\$ MILLIONS).....</i>	<i>76</i>
TISSUE SEALANTS AND HEMOSTATS	77
Bovine Serum/Albumin/Glutaraldehyde	77
Fibrin.....	77
Gelatin Matrix/Thrombin Sealants	78
Polyethylene Glycol Hydrogels	79
ADHESION BARRIERS	79
<i>TABLE 18 TYPES OF ADHESION BARRIERS AND</i>	
<i>MANUFACTURERS.....</i>	<i>80</i>
SKIN SUBSTITUTES	80
Skin Substitutes (Continued).....	81
<i>TABLE 19 MAJOR SKIN SUBSTITUTE PRODUCTS</i>	<i>82</i>
Skin Substitutes (Continued).....	83
Genetically Modified Skin Cells.....	84
GASTROINTESTINAL APPLICATIONS.....	85
<i>TABLE 20 U.S. MARKET FORECAST FOR GASTROINTESTINAL</i>	
<i>BIOMATERIALS BY SEGMENT, THROUGH 2012 (\$ MILLIONS)</i>	<i>85</i>
<i>FIGURE 12 U.S. MARKET FOR GASTROINTESTINAL</i>	
<i>BIOMATERIALS, BY SEGMENT, 2004-2012 (\$ MILLIONS).....</i>	<i>86</i>
UROLOGICAL BIOMATERIALS	87
<i>TABLE 21 U.S. MARKET FORECAST FOR UROLOGY BIOMATERIALS</i>	
<i>BY SEGMENT, THROUGH 2012 (\$ MILLIONS)</i>	<i>87</i>
URETERAL STENTS	Error! Bookmark not defined.
URETHRAL STENTS	88
URINARY CATHETERS	88
Removal.....	88
Resistance to Encrustation	89
Biofilms	89

<i>FIGURE 13 U.S. MARKET FOR UROLOGY BIOMATERIALS BY SEGMENT, 2004-2012 (\$ MILLIONS)</i>	90
THE MARKET FOR UROLOGY BIOMATERIALS	90
PLASTIC SURGERY	91
<i>TABLE 22 U.S. MARKET FORECAST FOR PLASTIC SURGERY BIOMATERIALS BY SEGMENT, THROUGH 2012 (\$ MILLIONS)</i>	91
BREAST IMPLANTS	91
Saline-Filled Implants.....	91
Silicone Gel Implants	92
Safety Considerations.....	93
Breakage and Leakage	93
Breakage and Leakage (Continued).....	94
Scarring	95
Platinum.....	95
INJECTABLE FILLERS.....	95
Zyderm and Zyplast Collagen	95
Fibrel	96
Artecoll	97
Hylan B Gel	97
Resoplast	97
Autologen	97
Isolagen	98
Dermalogen	98
AlloDerm	99
Fat Injections	99
<i>TABLE 23 COLLAGEN FILLERS</i>	100
FACIAL IMPLANTS	100
Teflon	100
Polyethylene.....	101
Hydroxyapatite	101
<i>FIGURE 14 U.S. MARKET FOR PLASTIC SURGERY BIOMATERIALS, BY SEGMENT 2004-2012 (\$ MILLIONS)</i>	102
THE MARKET FOR PLASTIC SURGERY BIOMATERIALS.....	102
The Market for Plastic ... (Continued)	103
ON THE HORIZON	104
BIOMATERIALS FOR GENE AND PROTEIN DELIVERY	104
ELECTROSPINNING SCAFFOLDS	104
COMPANY PROFILES	105
ABIOMED, INC	105
ADVANCED BIONICS CORPORATION	106
ALLERGAN INC.....	107
BAXTER INTERNATIONAL INC.....	108
BIOINTERACTIONS LTD.	109

BIOMET, INC	110
COCHLEAR CORPORATION.....	111
CONMED CORPORATION.....	112
DEPUY ORTHOPAEDICS, INC.	112
ENCORE ORTHOPEDICS.....	113
GUIDANT CORP.	114
INTERPORE CROSS INTERNATIONAL.....	115
JOHNSON & JOHNSON MEDICAL, INC.....	115
MEDICAL ELECTRONICS (MED-EL)	116
MEDTRONIC, INC.	117
MENTOR CORPORATION	118
MIV THERAPEUTICS	119
SOFAMOR DANEK GROUP.....	120
STAAR SURGICAL COMPANY	121
STRYKER CORPORATION	122
SULZER MEDICA	122
SULZER MEDICA (CONTINUED).....	123
SYNTHES CORPORATION.....	124
THORATEC LABORATORIES	125
ZIMMER CORP.....	126
MARKET SHARE.....	127
MARKET SHARE OF MAJOR COMPANIES' IMPLANTABLE MEDICAL DEVICES.....	127
<i>TABLE 24 MARKET SHARE OF MAJOR COMPANIES' IMPLANTABLE MEDICAL DEVICES (%).....</i>	<i>127</i>
<i>FIGURE 15 MARKET SHARE OF MAJOR COMPANIES IN IMPLANTABLE MEDICAL DEVICES (%).....</i>	<i>128</i>
MARKET SHARE OF MAJOR COMPANIES IN TISSUE REPLACEMENTS BIOMATERIALS.....	128
<i>TABLE 25 MARKET SHARE OF MAJOR COMPANIES IN TISSUE REPLACEMENTS (%).....</i>	<i>129</i>
<i>FIGURE 16 MARKET SHARE OF MAJOR COMPANIES IN TISSUE REPLACEMENTS (%).....</i>	<i>129</i>
MARKET SHARE OF MAJOR COMPANIES IN SURFACE COATINGS	129
<i>TABLE 26 MARKET SHARE OF MAJOR COMPANIES IN SURFACE COATINGS (%)</i>	<i>129</i>
<i>FIGURE 17 MARKET SHARE OF MAJOR COMPANIES IN SURFACE COATINGS (%)</i>	<i>130</i>