

# Table of Contents

<b>1</b>	<b>Executive Summary</b>	<b>7</b>
<b>2</b>	<b>Introduction/Scope</b>	<b>13</b>
<b>3</b>	<b>Overview- Applications and Materials</b>	<b>15</b>
3.1	Ceramic Materials	15
3.2	Ceramic Applications	20
3.3	Unique SiC Ceramic Components and Applications	25
<b>4</b>	<b>High-purity quartz powder market landscape</b>	<b>28</b>
4.1	Ceramic Raw Material Supplier Landscape	28
4.2	Base Material Suppliers	36
4.3	Fabricator Supplier Landscape	37
4.4	Overall Market Analysis	42
4.5	Semiconductor Market Overview	43
<b>5</b>	<b>Possible Supply Chain Issues</b>	<b>50</b>
5.1	Supplier Consolidation	50
5.2	Raw Materials	52
<b>6</b>	<b>Advanced Technologies/Future Trends</b>	<b>54</b>
6.1	Raw Materials Innovations	54
6.2	Ceramic Fabrication Innovations	55
<b>7</b>	<b>Environmental, Health, and Safety</b>	<b>59</b>
7.1	General Health and Safety	59
7.2	Raw Material Manufacturing Environmental Issues	61
<b>8</b>	<b>Ceramic Component Company Profiles and News</b>	<b>62</b>
8.1.1	Covalent Materials-CoorsTek	62
8.1.2	Asahi Glass	64
8.1.3	CoorsTek Semiconductor Equipment Component	66
8.1.4	CoorsTek-Saint Gobain	69
8.1.5	DOW Electronic Materials	72
8.1.6	Toyo Tanso	73
8.1.7	Morgan Technical Ceramics	74
8.1.8	Xycarb Ceramics	75
8.1.9	ADMAP INC	76
8.1.10	Bridgestone Inc	76
8.1.11	Entergis	77
8.1.12	Ferrotec Corporation	77
8.1.13	Hitachi Chemical	78
8.1.14	Kyocera	78
8.1.15	SGL Group	78
8.1.16	Solmics	79

8.1.17	Tokai Carbon Co. ....	79
8.1.18	Tokuyama Inc.....	80
8.1.19	NGK/NTK .....	80
8.1.20	Tokai Carbon Korea .....	80
8.1.21	Wordlex.....	81
<b>8.2</b>	<b>Ceramics Fabricators .....</b>	<b>82</b>
	3M Ceradyne	
	Applied Ceramics	
	Ariake Materials Company	
	Asuzac	
	Carborundum Universal Limited	
	Ceramic Tech	
	Ceramtec	
	Cercom Vista (CoorsTek)	
	Coalition Technology Co	
	CoorsTek	
	Covalent Ceramics	
	CRC Inc	
	Dow	
	Friatec	
	HC Stark	
	Innovacera	
	Kyocera	
	Maruwa	
	MiCo	
	Modern Ceramics	
	Momentive Performance Ceramics	
	Morgan TECh	
	NGK Insulators	
	Nihon Ceratec (NGK)	
	Shanghai Companion Precision Ceramics	
	Superior Technical Ceramics	
	Tokuyama	
	Toyo Tanso	
	US Technical Ceramics	
	Xycarb	

## List of Figures

	page #
Figure 1: 2014 Semiconductor Ceramic Components Total Sales .....	6
Figure 2: Thermal Process Component Materials (Qty) .....	25
Figure 3: Dry Etching System Component Materials (Qty) .....	27
Figure 4: Major Specialty Alumina Supplier Factory Capacities in Metric Tons/Year .....	30
Figure 5: Major Alumina Suppliers Technical Ceramic Market Share by Weight of Powder Sales (Metric Tons Per Year).....	31
Figure 6: Estimated Aluminum Nitride Suppliers Powder Production Market Share in 2015 (by weight materials sold).....	33
Figure 7: Estimated SiC Suppliers Powder Production Market Share in 2015 (by weight materials sold).....	34
Figure 9: Top Manufacturers Estimated Technical Ceramic Market Share (Semiconductor Parts Included) .....	40
Figure 10: Top Ceramics Manufacturers by Total Annual Revenues .....	40
Figure 11: 2014 Top Manufacturers Share of SiC Ceramic Revenues.....	41
Figure 12: Wafer Fab Equipment Market .....	42
Figure 14: Aluminum Nitride ESC/Pedestal Heater Market Share by Major OEMS .....	47
Figure 13: Aluminum Nitride OEM Ceramic and ESC/Pedestal Market (\$M).....	46
Figure 15: Regional Market Share of New Tool SiC Ceramic Parts .....	49

## List of Tables

	page #
Table 1: Ceramic Materials Properties.....	20
Table 2: Ceramic Applications in Semiconductor Process Modules.....	21
Table 3: Replacement Cycle and Estimated Price of Focus Rings .....	26
Table 4: Major High Purity Ceramic Powder Suppliers.....	28
Table 5: Ceramic Suppliers' Offerings (Alphabetical Listing) .....	39
Table 6: Semiconductor Market Growth.....	43
Table 7: Estimated WW Market for OEM Semiconductor Technical Ceramic Components (Including Oxides, Nitrides, AlN, and SiC).....	44
Table 8: Estimated WW Market for OEM Semiconductor Oxide and Nitride Ceramic Components (Excluding AlN and SiC) .....	45
Table 9: Estimated WW Market for Semiconductor SiC Ceramic Components (CVD and Sintered).....	45
Table 10: Estimated Regional Consumption Market for Ceramic OEM Components as a % of Total Revenues (final end users, excluding AlN and SiC)* .....	46
Table 11: Applications for Selected Components and Typical Pricing (300mm) .....	48
Table 12: SiC Ceramics Parts Regional Sales for New OEM Tool Consumption (expressed as a % of WW consumption) for IC Producers .....	48
Table 13: General Strength Comparison .....	56
Table 14: Product Material Comparison .....	56
Table 15: CoorsTek Product List .....	67