

## **Thin-Film Encapsulation (TFE) Market by Application (OLED Display, OLED Lighting, and Thin-Film Photovoltaic), Deposition Type (Inorganic Layers (PECVD, ALD) and Organic Layers (Inkjet Printing and VTE), Vertical and Region - Global Forecast to 2027**

Market Report | 2022-11-10 | 190 pages | MarketsandMarkets

### **AVAILABLE LICENSES:**

- Single User \$4950.00
- Multi User \$6650.00
- Corporate License \$8150.00
- Enterprise Site License \$10000.00

### **Report description:**

The thin-film encapsulation (TFE) market is estimated to grow from USD 92 million in 2022 to reach USD 223 million by 2027; it is expected to grow at a CAGR of 19.4% from 2022 to 2027. The growth of the thin-film encapsulation (TFE) market can be attributed to growing use of thin-film barriers in flexible and organic electronic devices and rising trend of TFE using inkjet printing technology.

"The flexible OLED display thin-film encapsulation (TFE) market for automobile displays is expected to grow at the highest CAGR from 2022 to 2027"

OLED displays are gradually emerging as the most preferred display technology among automobile companies such as General Motors, Audi, Toyota, Volkswagen, and Mercedes-Benz. With stabilized ASP and improvement in the reliability of OLED technology, the adoption of OLED displays in the automotive industry is likely to increase in the coming years. In November 2021, Continental earned its first major order for OLED displays in a production vehicle from a global vehicle manufacturer, with a total order value of around USD 1 billion. The multi-display stretches from the driver's area to the center console and integrates two screens, which are optically bonded behind a curved glass surface.

"Thin-film encapsulation (TFE) market for consumer electronics vertical is expected to hold the largest share during the forecast period."

The consumer electronics segment is expected to continue to account for the largest size of the TFE market during the forecast period. The consumer electronics vertical includes products such as smartphones, television sets, smart wearables, PC monitors and laptops, and tablets-all of which have significant shares in the global TFE market. The growth of OLED displays in the

**Scotts International. EU Vat number: PL 6772247784**

tel. 0048 603 394 346 e-mail: [support@scotts-international.com](mailto:support@scotts-international.com)

[www.scotts-international.com](http://www.scotts-international.com)

consumer vertical is expected to drive the TFE market growth.

"The thin-film encapsulation (TFE) market in Europe is expected to grow at the second highest CAGR during forecast period." Europe is an important region due to the presence of various developers and manufacturers of flexible OLED lighting panels, flexible solar cells, flexible batteries, and architectural materials across different European countries. The substantial growth of the automotive and manufacturing industries in the region is one of the key drivers for the growth of the TFE market in Europe. The rising demand for OLEDs by the automotive and advertising markets will contribute significantly to the growth of the TFE market in the region.

Breakdown of the profile of primary participants:

-□By Company Type: Tier 1 - 30%, Tier 2 - 50%, and Tier 3 - 20%

-□By Designation: C-level Executives - 30%, Directors - 45%, Others - 25%

-□By Region: North America - 20%, Europe - 30%, Asia Pacific - 45%, and RoW - 5%

Key players in the thin-film encapsulation (TFE) market are Samsung SDI Co., Ltd. (South Korea); LG Chem (South Korea); 3M (US); Toppan Inc. (Japan); Ergis Group (Poland); Veeco Instruments Inc. (US); Universal Display Corporation (US); Applied Materials, Inc. (US); Kateeva (US); Toray Industries, Inc. (Japan); tesa (Germany); Ajinomoto Fine-Techno Co., Inc. (Japan); Coat-X (Switzerland); and Borealis AG (Austria).

Research Coverage

Based on deposition type, the TFE market has been segmented into inorganic layer deposition and organic layer deposition. Based on application, the TFE market has been segmented into flexible OLED display, flexible OLED lighting, thin-film photovoltaics, and others. Based on vertical, the TFE market has been segmented into consumer electronics, automotive, sports and entertainment, transportation, retail, hospitality, and BFSI, industrial and enterprise, education, healthcare, aerospace and defense, and others. Based on region, the TFE market has been segmented into North America, Europe, Asia Pacific, and Rest of the World (RoW).

Reasons to Buy Report

The report would help market leaders/new entrants in the following ways:

- 1.□This report segments the TFE market comprehensively and provides the closest approximations of the overall market size, as well as that of the subsegments across deposition types, applications, verticals, and regions.
- 2.□The report helps stakeholders understand the pulse of the market and provides information on key market drivers, restraints, challenges, and opportunities.
- 3.□This report would help stakeholders understand their competitors better and gain more insights to enhance their position in the business. The competitive landscape provides market share analysis and company evaluation quadrant for the key players operating in the TFE market.

## Table of Contents:

1□INTRODUCTION□	24
1.1□STUDY OBJECTIVES□	24
1.2□MARKET DEFINITION□	24
1.3□INCLUSIONS AND EXCLUSIONS□	25
1.4□STUDY SCOPE□	26
1.4.1□MARKETS COVERED□	26
FIGURE 1□TFE MARKET: SEGMENTATION□	26
1.4.2□REGIONAL SCOPE□	27
1.5□YEARS CONSIDERED□	27
1.6□CURRENCY CONSIDERED□	27
1.7□UNIT CONSIDERED□	28
1.8□LIMITATIONS□	28
1.9□STAKEHOLDERS□	28
1.10□SUMMARY OF CHANGES□	29

**Scotts International. EU Vat number: PL 6772247784**

tel. 0048 603 394 346 e-mail: support@scotts-international.com

www.scotts-international.com

2	RESEARCH METHODOLOGY	30
2.1	RESEARCH DATA	30
FIGURE 2	TFE MARKET SIZE ESTIMATION AND PROCESS FLOW	30
FIGURE 3	TFE MARKET: RESEARCH DESIGN	31
2.1.1	SECONDARY DATA	32
2.1.1.1	Key data from secondary sources	32
2.1.2	PRIMARY DATA	32
2.1.2.1	Primary interviews with experts	33
2.1.2.2	Key data from primary sources	33
2.1.2.3	Key industry insights	34
2.1.2.4	Breakdown of primaries	34
2.1.3	SECONDARY AND PRIMARY RESEARCH	35
2.2	MARKET SIZE ESTIMATION	35
FIGURE 4	MARKET SIZE ESTIMATION METHODOLOGY: APPROACH 1 (SUPPLY SIDE): REVENUE GENERATED FROM SALES OF TFE IN 2021	36
FIGURE 5	MARKET SIZE ESTIMATION METHODOLOGY: APPROACH 2 (DEMAND SIDE): ESTIMATION OF TFE MARKET SIZE, BY APPLICATION	36
2.2.1	BOTTOM-UP APPROACH	37
2.2.1.1	Approach for deriving market size using bottom-up analysis (demand side)	37
FIGURE 6	MARKET SIZE ESTIMATION METHODOLOGY: BOTTOM-UP APPROACH	37
2.2.2	TOP-DOWN APPROACH	37
2.2.2.1	Approach for deriving market size using top-down analysis do (supply side)	38
FIGURE 7	MARKET SIZE ESTIMATION METHODOLOGY: TOP-DOWN APPROACH	38
2.2.3	MARKET SHARE ESTIMATION	38
2.3	MARKET BREAKDOWN AND DATA TRIANGULATION	39
FIGURE 8	MARKET BREAKDOWN AND DATA TRIANGULATION	39
2.4	RESEARCH ASSUMPTIONS	40
TABLE 1	ASSUMPTIONS FOR RESEARCH STUDY	40
2.4.1	GROWTH RATE ASSUMPTIONS/FORECASTS	40
2.5	LIMITATIONS	41
2.6	RISK ASSESSMENT	41
3	EXECUTIVE SUMMARY	42
FIGURE 9	FLEXIBLE OLED DISPLAY TO BE LARGEST SEGMENT OF TFE MARKET DURING FORECAST PERIOD	43
FIGURE 10	ASIA PACIFIC TFE MARKET TO REGISTER HIGHEST CAGR DURING FORECAST PERIOD	44
4	PREMIUM INSIGHTS	45
4.1	ATTRACTIVE OPPORTUNITIES FOR PLAYERS OPERATING IN TFE MARKET	45
FIGURE 11	HIGH DEMAND FOR TFE IN CONSUMER ELECTRONICS VERTICAL	45
4.2	TFE MARKET, BY DEPOSITION TECHNOLOGY	45
FIGURE 12	ORGANIC LAYERS DEPOSITION SEGMENT TO HOLD LARGER SHARE OF TFE MARKET DURING FORECAST PERIOD	45
4.3	TFE MARKET, BY VERTICAL	46
FIGURE 13	CONSUMER ELECTRONICS SEGMENT TO HOLD MAJORITY OF MARKET SHARE IN 2027	46
4.4	TFE MARKET, BY FLEXIBLE OLED DISPLAY APPLICATION	46
FIGURE 14	SMARTPHONES SEGMENT TO HOLD LARGEST SHARE OF TFE MARKET FOR FLEXIBLE OLED DISPLAY DURING FORECAST PERIOD	46
4.5	ASIA PACIFIC TFE MARKET, BY COUNTRY AND VERTICAL	47

FIGURE 15	CONSUMER ELECTRONICS AND SOUTH KOREA TO HOLD MAJOR SHARES OF ASIA PACIFIC TFE MARKET IN 2022	47
4.6	TFE MARKET, BY COUNTRY	47
FIGURE 16	CHINA TO EXHIBIT HIGHEST CAGR IN TFE MARKET DURING FORECAST PERIOD	47
5	MARKET OVERVIEW	48
5.1	INTRODUCTION	48
5.2	MARKET DYNAMICS	48
FIGURE 17	TFE MARKET: DRIVERS, RESTRAINTS, OPPORTUNITIES, AND CHALLENGES	48
5.2.1	DRIVERS	49
FIGURE 18	TFE MARKET: DRIVERS AND THEIR IMPACT	49
5.2.1.1	Growing use of thin-film barriers in flexible and organic electronic devices	49
5.2.1.2	Rising trend of TFE using inkjet printing technology	50
5.2.1.3	Integration of flexible OLED displays into smartphones and smart wearables	50
5.2.1.4	Rising investments in building new facilities to manufacture OLED panels	51
5.2.1.5	Increased application of OLED displays in AR/VR headsets	51
5.2.2	RESTRAINTS	52
FIGURE 19	TFE MARKET: RESTRAINTS AND THEIR IMPACT	52
5.2.2.1	High capital expenditure associated with TFE	52
5.2.3	OPPORTUNITIES	52
FIGURE 20	TFE MARKET: OPPORTUNITIES AND THEIR IMPACT	52
5.2.3.1	Rising demand for highly efficient thin solar cells	53
5.2.3.2	Increasing applications of smart mirrors in smart homes	53
5.2.4	CHALLENGES	54
FIGURE 21	TFE MARKET: CHALLENGES AND THEIR IMPACT	54
5.2.4.1	Complex value chain structure	54
5.3	VALUE CHAIN ANALYSIS	55
FIGURE 22	VALUE CHAIN ANALYSIS: MAJOR VALUE ADDED BY ORIGINAL EQUIPMENT MANUFACTURERS AND TFE SYSTEM INTEGRATORS	55
5.4	ECOSYSTEM ANALYSIS	56
FIGURE 23	TFE MARKET: ECOSYSTEM ANALYSIS	56
TABLE 2	TFE MARKET: ROLE IN ECOSYSTEM	57
5.5	TECHNOLOGY ANALYSIS	58
5.6	PATENT ANALYSIS	58
FIGURE 24	NUMBER OF PATENTS FILED PER YEAR, 2012-2021	58
FIGURE 25	TOP 10 COMPANIES WITH HIGHEST NUMBER OF PATENT APPLICATIONS IN LAST 10 YEARS	59
TABLE 3	LIST OF TOP PATENT OWNERS IN LAST 10 YEARS	59
5.6.1	TFE MARKET: LIST OF MAJOR PATENTS	59
TABLE 4	TFE MARKET: LIST OF MAJOR PATENTS	59
5.7	CASE STUDY ANALYSIS	62
5.7.1	BENEQ PROVIDES TFE FOR OLED LIGHTING	62
5.7.2	MEYER BURGER OFFERS INKJET + PECVD OLED ENCAPSULATION SYSTEM FOR FLEXIBLE OLEDs	62
5.7.3	AGORIA SOLAR TEAM USES BOREALIS' QUENTYS-GRADE FILMS TO ENCAPSULATE AND PROTECT SOLAR CELLS MOUNTED ON RACING CARS	63
5.8	TRENDS/DISRUPTIONS IMPACTING CUSTOMERS' BUSINESSES	63
FIGURE 26	TRENDS/DISRUPTIONS IMPACTING CUSTOMERS' BUSINESSES IN TFE MARKET	63
5.9	TRADE ANALYSIS	64
FIGURE 27	IMPORT DATA FOR HS CODE 848620, BY COUNTRY, 2017-2021	64
FIGURE 28	EXPORT DATA FOR HS CODE 848620, BY COUNTRY, 2017-2021	65

5.10	PORTER'S FIVE FORCES ANALYSIS	65
TABLE 5 TFE MARKET: PORTER'S FIVE FORCES ANALYSIS		
5.10.1	INTENSITY OF COMPETITIVE RIVALRY	66
5.10.2	BARGAINING POWER OF SUPPLIERS	66
5.10.3	BARGAINING POWER OF BUYERS	66
5.10.4	THREAT OF SUBSTITUTES	66
5.10.5	THREAT OF NEW ENTRANTS	66
5.11	TARIFF ANALYSIS	67
TABLE 6 TARIFF IMPOSED ON PRODUCTS UNDER HS CODE 848620 EXPORTED BY SOUTH KOREA		
TABLE 7 TARIFF IMPOSED ON PRODUCTS UNDER HS CODE 848620 EXPORTED BY US		
TABLE 8 TARIFF IMPOSED ON PRODUCTS UNDER HS CODE 848620 EXPORTED BY CHINA		
5.12	STANDARDS AND REGULATORY LANDSCAPE	68
5.12.1	REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS	68
TABLE 9 NORTH AMERICA: LIST OF REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS		
TABLE 10 EUROPE: LIST OF REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS		
TABLE 11 ASIA PACIFIC: LIST OF REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS		
TABLE 12 ROW: LIST OF REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS		
5.12.2	STANDARDS	71
5.12.3	RESTRICTION OF HAZARDOUS SUBSTANCES (ROHS) AND WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) DIRECTIVES	71
5.12.4	REGISTRATION, EVALUATION, AUTHORIZATION, AND RESTRICTION OF CHEMICALS (REACH)	72
5.12.5	GENERAL DATA PROTECTION REGULATION (GDPR)	72
5.12.6	IMPORT-EXPORT LAWS	72
5.13	KEY STAKEHOLDERS AND BUYING CRITERIA	73
5.13.1	KEY STAKEHOLDERS IN BUYING PROCESS	73
FIGURE 29 INFLUENCE OF STAKEHOLDERS ON BUYING PROCESS, BY TOP 3 VERTICALS		
TABLE 13 INFLUENCE OF STAKEHOLDERS ON BUYING PROCESS, BY TOP 3 VERTICALS (%)		
5.13.2	BUYING CRITERIA	74
FIGURE 30 KEY BUYING CRITERIA FOR TOP 3 VERTICALS		
TABLE 14 KEY BUYING CRITERIA FOR TOP 3 VERTICALS		
5.14	PRICING ANALYSIS	75
5.14.1	AVERAGE SELLING PRICE OF TFE OFFERED BY MAJOR MARKET PLAYERS TO TOP THREE VERTICALS	75
FIGURE 31 AVERAGE SELLING PRICE OF TFE OFFERED BY MAJOR MARKET PLAYERS TO TOP THREE VERTICALS		
TABLE 15 AVERAGE SELLING PRICE OF TFE OFFERED BY MAJOR MARKET PLAYERS TO TOP THREE VERTICALS		
5.15	KEY CONFERENCES AND EVENTS, 2022-2023	76
TABLE 16 TFE MARKET: DETAILED LIST OF CONFERENCES AND EVENTS		
?		
6	TFE MARKET, BY DEPOSITION TYPE	77
6.1	INTRODUCTION	78
FIGURE 32 TFE MARKET FOR INORGANIC LAYER DEPOSITION SEGMENT TO REGISTER HIGHER CAGR DURING FORECAST PERIOD		
TABLE 17 TFE MARKET, BY DEPOSITION TYPE, 2018-2021 (USD MILLION)		
TABLE 18 TFE MARKET, BY DEPOSITION TYPE, 2022-2027 (USD MILLION)		
6.2	INORGANIC LAYER DEPOSITION	79
TABLE 19 INORGANIC LAYER DEPOSITION: TFE MARKET, BY TECHNOLOGY, 2018-2021 (USD MILLION)		
TABLE 20 INORGANIC LAYER DEPOSITION: TFE MARKET, BY TECHNOLOGY, 2022-2027 (USD MILLION)		
6.2.1	PECVD	80

6.2.1.1	Deposits substrates at a lower temperature	80
6.2.2	ALD	80
6.2.2.1	Demand for ALD-based equipment to deposit barrier films on thermally fragile or flexible substrates	80
6.2.3	SPUTTERING	80
6.2.3.1	Provides improved sputter protection of organic materials used in flexible electronic devices	80
6.3	ORGANIC LAYER DEPOSITION	81
TABLE 21	ORGANIC LAYER DEPOSITION: TFE MARKET, BY TECHNOLOGY, 2018-2021 (USD MILLION)	81
TABLE 22	ORGANIC LAYER DEPOSITION: TFE MARKET, BY TECHNOLOGY, 2022-2027 (USD MILLION)	81
6.3.1	INKJET PRINTING	82
6.3.1.1	Helps in high-volume production of organic electronic devices with TFE	82
6.3.2	VACUUM THERMAL EVAPORATION (VTE)	82
6.3.2.1	Used to deposit metals on OLEDs, solar cells, and thin-film transistors	82
7	TFE MARKET, BY APPLICATION	83
7.1	INTRODUCTION	84
FIGURE 33	FLEXIBLE OLED LIGHTING SEGMENT TO REGISTER HIGHEST CAGR DURING FORECAST PERIOD	84
TABLE 23	TFE MARKET, BY APPLICATION, 2018-2021 (USD MILLION)	84
TABLE 24	TFE MARKET, BY APPLICATION, 2022-2027 (USD MILLION)	85
7.2	FLEXIBLE OLED DISPLAY	85
7.2.1	GROWING POPULARITY OF OLEDs IN SMARTPHONES, SMART WEARABLE DEVICES, AND LARGE DISPLAY PANELS	85
TABLE 25	FLEXIBLE OLED DISPLAY: TFE MARKET, BY APPLICATION, 2018-2021 (THOUSAND SQUARE METERS)	86
TABLE 26	FLEXIBLE OLED DISPLAY: TFE MARKET, BY APPLICATION, 2022-2027 (THOUSAND SQUARE METERS)	86
TABLE 27	FLEXIBLE OLED DISPLAY: TFE MARKET, BY APPLICATION, 2018-2021 (USD THOUSAND)	87
TABLE 28	FLEXIBLE OLED DISPLAY: TFE MARKET, BY APPLICATION, 2022-2027 (USD THOUSAND)	87
TABLE 29	FLEXIBLE OLED DISPLAY: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	87
TABLE 30	FLEXIBLE OLED DISPLAY: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	88
TABLE 31	ASIA PACIFIC: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY COUNTRY, 2018-2021 (USD THOUSAND)	88
TABLE 32	ASIA PACIFIC: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY COUNTRY, 2022-2027 (USD THOUSAND)	89
TABLE 33	EUROPE: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY COUNTRY, 2018-2021 (USD THOUSAND)	89
TABLE 34	EUROPE: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY COUNTRY, 2022-2027 (USD THOUSAND)	89
TABLE 35	NORTH AMERICA: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY COUNTRY, 2018-2021 (USD THOUSAND)	90
TABLE 36	NORTH AMERICA: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY COUNTRY, 2022-2027 (USD THOUSAND)	90
TABLE 37	ROW: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2018-2021 (USD THOUSAND)	90
TABLE 38	ROW: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2022-2027 (USD THOUSAND)	90
7.2.2	SMARTPHONES	91
7.2.2.1	Rising use of TFE materials in smartphone manufacturing	91
TABLE 39	SMARTPHONES: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2018-2021 (USD THOUSAND)	91
TABLE 40	SMARTPHONES: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2022-2027 (USD THOUSAND)	91
7.2.3	TABLETS	92
7.2.3.1	Growing use of OLED screens in Samsung Galaxy tablets	92
TABLE 41	TABLETS: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2018-2021 (USD THOUSAND)	92
TABLE 42	TABLETS: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2022-2027 (USD THOUSAND)	92
7.2.4	TELEVISIONS (TVS) AND SIGNAGE	93
7.2.4.1	High demand for large format displays in retail, BFSI, sports, and education verticals	93
TABLE 43	TVS AND SIGNAGE: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2018-2021 (USD THOUSAND)	93
TABLE 44	TVS AND SIGNAGE: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2022-2027 (USD THOUSAND)	93
7.2.5	PC MONITORS AND LAPTOPS	94
7.2.5.1	High use of OLED displays in PC monitors and laptops	94

TABLE 45	PC MONITORS AND LAPTOPS: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2018-2021 (USD THOUSAND)	94
TABLE 46	PC MONITORS AND LAPTOPS: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2022-2027 (USD THOUSAND)	94
?		
7.2.6	SMART WEARABLES	95
7.2.6.1	Increasing integration of OLED technology into smartwatches and AR/VR headsets	95
TABLE 47	SMART WEARABLES: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2018-2021 (USD THOUSAND)	96
TABLE 48	SMART WEARABLES: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2022-2027 (USD THOUSAND)	96
7.2.7	AUTOMOBILE DISPLAYS	96
7.2.7.1	Growing integration of OLED technology into instrument clusters, dashboard displays, and center stack displays	96
TABLE 49	AUTOMOBILE DISPLAYS: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2018-2021 (USD THOUSAND)	97
TABLE 50	AUTOMOBILE DISPLAYS: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2022-2027 (USD THOUSAND)	97
7.2.8	OTHERS	98
TABLE 51	OTHERS: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2018-2021 (USD THOUSAND)	98
TABLE 52	OTHERS: TFE MARKET FOR FLEXIBLE OLED DISPLAY, BY REGION, 2022-2027 (USD THOUSAND)	98
7.3	FLEXIBLE OLED LIGHTING	99
7.3.1	INCREASING DEMAND FOR OLED LIGHTING PANELS IN AUTOMOTIVE INDUSTRY	99
TABLE 53	FLEXIBLE OLED LIGHTING: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	99
TABLE 54	FLEXIBLE OLED LIGHTING: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	100
7.4	THIN-FILM PHOTOVOLTAICS	100
7.4.1	RIISING USE OF OLED TECHNOLOGY TO MANUFACTURE INSTRUMENT CLUSTERS, DASHBOARD DISPLAYS, AND CENTER STACK DISPLAYS	100
TABLE 55	THIN-FILM PHOTOVOLTAICS: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	100
TABLE 56	THIN-FILM PHOTOVOLTAICS: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	101
7.5	OTHERS	101
TABLE 57	OTHERS: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	101
TABLE 58	OTHERS: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	101
8	TFE MARKET, BY VERTICAL	102
8.1	INTRODUCTION	103
FIGURE 34	TFE MARKET FOR CONSUMER ELECTRONICS SEGMENT TO HOLD LARGEST SHARE DURING FORECAST PERIOD	103
TABLE 59	TFE MARKET, BY VERTICAL, 2018-2021 (USD THOUSAND)	103
TABLE 60	TFE MARKET, BY VERTICAL, 2022-2027 (USD THOUSAND)	104
8.2	CONSUMER ELECTRONICS	104
8.2.1	CONSUMER ELECTRONICS SEGMENT TO CAPTURE LARGEST MARKET SIZE	104
TABLE 61	CONSUMER ELECTRONICS: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	105
TABLE 62	CONSUMER ELECTRONICS: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	105
8.3	AUTOMOTIVE	105
8.3.1	GROWING REPLACEMENT OF ANALOG COMPONENTS WITH DIGITAL ONES IN VEHICLES	105
TABLE 63	AUTOMOTIVE: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	106
TABLE 64	AUTOMOTIVE: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	106
8.4	HEALTHCARE	106
8.4.1	DIGITALIZATION OF HEALTHCARE SYSTEMS	106
TABLE 65	HEALTHCARE: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	107
TABLE 66	HEALTHCARE: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	107
8.5	INDUSTRIAL AND ENTERPRISE	107
8.5.1	INCREASING ADOPTION OF AR/VR HMDS	107
TABLE 67	INDUSTRIAL AND ENTERPRISE: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	108
TABLE 68	INDUSTRIAL AND ENTERPRISE: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	108

8.6	AEROSPACE & DEFENSE	108
8.6.1	RISING ADOPTION OF AR AND VR HMDS IN AEROSPACE & DEFENSE VERTICAL	108
TABLE 69	AEROSPACE AND DEFENSE: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	109
TABLE 70	AEROSPACE AND DEFENSE: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	109
8.7	RETAIL, HOSPITALITY, AND BFSI	109
8.7.1	HIGH ADOPTION OF OLED DIGITAL SIGNAGE DISPLAYS	109
TABLE 71	RETAIL, HOSPITALITY, AND BFSI: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	110
TABLE 72	RETAIL, HOSPITALITY, AND BFSI: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	110
8.8	EDUCATION	110
8.8.1	TRANSITION TO ONLINE LEARNING	110
TABLE 73	EDUCATION: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	111
TABLE 74	EDUCATION: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	111
8.9	TRANSPORTATION	111
8.9.1	HIGH DEMAND FOR TFE FOR LARGE FORMAT DISPLAYS	111
TABLE 75	TRANSPORTATION: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	112
TABLE 76	TRANSPORTATION: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	112
8.10	SPORTS & ENTERTAINMENT	112
8.10.1	RAPID PENETRATION OF AR/VR HMDS INTO SPORTS & ENTERTAINMENT VERTICAL	112
TABLE 77	SPORTS AND ENTERTAINMENT: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	113
TABLE 78	SPORTS AND ENTERTAINMENT: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	113
8.11	OTHERS	113
TABLE 79	OTHERS: TFE MARKET, BY REGION, 2018-2021 (USD THOUSAND)	114
TABLE 80	OTHERS: TFE MARKET, BY REGION, 2022-2027 (USD THOUSAND)	114
9	TFE MARKET, BY REGION	115
9.1	INTRODUCTION	116
FIGURE 35	ASIA PACIFIC TO BE LARGEST TFE MARKET DURING FORECAST PERIOD	116
TABLE 81	TFE MARKET, BY REGION, 2018-2021 (USD MILLION)	116
TABLE 82	TFE MARKET, BY REGION, 2022-2027 (USD MILLION)	117
9.2	ASIA PACIFIC	117
FIGURE 36	ASIA PACIFIC: TFE MARKET SNAPSHOT	118
TABLE 83	ASIA PACIFIC: TFE MARKET, BY COUNTRY, 2018-2021 (USD MILLION)	118
TABLE 84	ASIA PACIFIC: TFE MARKET, BY COUNTRY, 2022-2027 (USD MILLION)	119
TABLE 85	ASIA PACIFIC: TFE MARKET, BY VERTICAL, 2018-2021 (USD THOUSAND)	119
TABLE 86	ASIA PACIFIC: TFE MARKET, BY VERTICAL, 2022-2027 (USD THOUSAND)	120
9.2.1	SOUTH KOREA	120
9.2.1.1	Rising developments by Samsung and LG Display in OLED lighting	120
9.2.2	CHINA	121
9.2.2.1	Increasing demand and production of solar cells	121
9.2.3	JAPAN	121
9.2.3.1	Large presence of OLED lighting players and OLED display manufacturers	121
9.2.4	TAIWAN	122
9.2.4.1	Increasing demand for TFE in AMOLED panel display manufacturing	122
9.2.5	REST OF ASIA PACIFIC	122
9.3	EUROPE	123
FIGURE 37	EUROPE: TFE MARKET SNAPSHOT	124
TABLE 87	EUROPE: TFE MARKET, BY COUNTRY, 2018-2021 (USD MILLION)	124
TABLE 88	EUROPE: TFE MARKET, BY COUNTRY, 2022-2027 (USD MILLION)	125



TABLE 89	EUROPE: TFE MARKET, BY VERTICAL, 2018-2021 (USD THOUSAND)	125
TABLE 90	EUROPE: TFE MARKET, BY VERTICAL, 2022-2027 (USD THOUSAND)	126
9.3.1	GERMANY	126
9.3.1.1	High demand for flexible OLED lighting panels in automotive industry	126
9.3.2	UK	127
9.3.2.1	High demand from smartphone and AR/VR technology developers	127
9.3.3	FRANCE	127
9.3.3.1	Rising government-led investments in consumer electronics vertical	127
9.3.4	REST OF EUROPE	127
9.4	NORTH AMERICA	128
FIGURE 38	NORTH AMERICA: TFE MARKET SNAPSHOT	129
TABLE 91	NORTH AMERICA: TFE MARKET, BY COUNTRY, 2018-2021 (USD MILLION)	129
TABLE 92	NORTH AMERICA: TFE MARKET, BY COUNTRY, 2022-2027 (USD MILLION)	130
TABLE 93	NORTH AMERICA: TFE MARKET, BY VERTICAL, 2018-2021 (USD THOUSAND)	130
TABLE 94	NORTH AMERICA: TFE MARKET, BY VERTICAL, 2022-2027 (USD THOUSAND)	131
9.4.1	US	131
9.4.1.1	Large presence of OLED display consumer base	131
9.4.2	CANADA	132
9.4.2.1	High demand in food service industry	132
9.4.3	MEXICO	132
9.4.3.1	Expanding automotive, retail, medical, and industrial sectors	132
9.5	ROW	132
TABLE 95	ROW: TFE MARKET, BY REGION, 2018-2021 (USD MILLION)	133
TABLE 96	ROW: TFE MARKET, BY REGION, 2022-2027 (USD MILLION)	133
TABLE 97	ROW: TFE MARKET, BY VERTICAL, 2018-2021 (USD THOUSAND)	133
TABLE 98	ROW: TFE MARKET, BY VERTICAL, 2022-2027 (USD THOUSAND)	134
9.5.1	MIDDLE EAST & AFRICA	134
9.5.1.1	Increasing use of video walls, digital signage, and interactive kiosks in shopping malls and museums	134
9.5.2	SOUTH AMERICA	135
9.5.2.1	Growing outdoor advertising events	135
10	COMPETITIVE LANDSCAPE	136
10.1	OVERVIEW	136
10.2	STRATEGIES ADOPTED BY KEY PLAYERS/RIGHT TO WIN	136
TABLE 99	OVERVIEW OF STRATEGIES ADOPTED BY KEY COMPANIES IN TFE MARKET	136
10.3	FIVE-YEAR COMPANY REVENUE ANALYSIS	138
FIGURE 39	FIVE-YEAR REVENUE ANALYSIS OF TOP PLAYERS IN TFE MARKET	138
10.4	MARKET SHARE ANALYSIS, 2021	138
TABLE 100	TFE MARKET: DEGREE OF COMPETITION	138
10.5	COMPANY EVALUATION QUADRANT	140
10.5.1	STARS	140
10.5.2	EMERGING LEADERS	140
10.5.3	PERVASIVE PLAYERS	140
10.5.4	PARTICIPANTS	140
FIGURE 40	TFE MARKET (GLOBAL): COMPANY EVALUATION QUADRANT, 2021	141
10.6	STARTUP/SME EVALUATION QUADRANT, 2021	142
10.6.1	PROGRESSIVE COMPANIES	142
10.6.2	RESPONSIVE COMPANIES	142

**Scotts International. EU Vat number: PL 6772247784**

tel. 0048 603 394 346 e-mail: support@scotts-international.com

www.scotts-international.com

10.6.3	DYNAMIC COMPANIES	142
10.6.4	STARTING BLOCKS	142
FIGURE 41	TFE MARKET: STARTUP/SME EVALUATION QUADRANT, 2021	143
10.7	TFE MARKET: COMPANY PRODUCT FOOTPRINT	144
TABLE 101	PRODUCT FOOTPRINT OF COMPANIES	144
TABLE 102	VERTICAL FOOTPRINT OF COMPANIES	145
TABLE 103	APPLICATION FOOTPRINT OF COMPANIES	146
TABLE 104	REGIONAL FOOTPRINT OF COMPANIES	147
10.8	TFE MARKET: COMPETITIVE BENCHMARKING	148
TABLE 105	TFE MARKET: DETAILED LIST OF KEY STARTUPS/SMES	148
TABLE 106	TFE MARKET: COMPETITIVE BENCHMARKING OF KEY STARTUPS/SMES, BY VERTICAL	148
TABLE 107	TFE MARKET: COMPETITIVE BENCHMARKING OF KEY STARTUPS/SMES, BY APPLICATION	149
TABLE 108	TFE MARKET: COMPETITIVE BENCHMARKING OF KEY STARTUPS/SMES, BY REGION	149
10.9	COMPETITIVE SCENARIOS AND TRENDS	150
TABLE 109	TFE MARKET: PRODUCT LAUNCHES, JANUARY 2020-AUGUST 2022	150
TABLE 110	TFE MARKET: DEALS, JANUARY 2020-AUGUST 2022	150
11	COMPANY PROFILES	152
11.1	KEY PLAYERS	152
	(Business overview, Products offered, Recent Developments, MNM view)*	
11.1.1	SAMSUNG SDI CO., LTD.	152
TABLE 111	SAMSUNG SDI: COMPANY OVERVIEW	152
FIGURE 42	SAMSUNG SDI: COMPANY SNAPSHOT	153
11.1.2	LG CHEM LTD.	155
TABLE 112	LG CHEM: COMPANY OVERVIEW	155
FIGURE 43	LG CHEM: COMPANY SNAPSHOT	156
11.1.3	3M	158
TABLE 113	3M: COMPANY OVERVIEW	158
FIGURE 44	3M: COMPANY SNAPSHOT	159
11.1.4	TOPPAN INC.	162
TABLE 114	TOPPAN INC.: COMPANY OVERVIEW	162
FIGURE 45	TOPPAN INC.: COMPANY SNAPSHOT	163
11.1.5	TORAY INDUSTRIES, INC.	165
TABLE 115	TORAY INDUSTRIES, INC.: COMPANY OVERVIEW	165
FIGURE 46	TORAY INDUSTRIES, INC.: COMPANY SNAPSHOT	166
11.1.6	ERGIS GROUP	169
TABLE 116	ERGIS GROUP: COMPANY OVERVIEW	169
11.1.7	VEECO INSTRUMENTS INC.	170
TABLE 117	VEECO INSTRUMENTS: COMPANY OVERVIEW	170
FIGURE 47	VEECO INSTRUMENTS: COMPANY SNAPSHOT	171
11.1.8	UNIVERSAL DISPLAY CORP.	173
TABLE 118	UNIVERSAL DISPLAY CORP.: COMPANY OVERVIEW	173
FIGURE 48	UNIVERSAL DISPLAY CORP.: COMPANY SNAPSHOT	174
11.1.9	APPLIED MATERIALS, INC.	176
TABLE 119	APPLIED MATERIALS, INC.: COMPANY OVERVIEW	176

FIGURE 49 □ APPLIED MATERIALS, INC.: COMPANY SNAPSHOT □ 177

11.1.10 □ KATEEVA □ 179

TABLE 120 □ KATEEVA: COMPANY OVERVIEW □ 179

11.2 □ OTHER PLAYERS □ 180

11.2.1 □ TESA □ 180

11.2.2 □ AJINOMOTO FINE-TECHNO CO., INC. □ 180

11.2.3 □ COAT-X □ 181

11.2.4 □ BOREALIS AG □ 181

11.2.5 □ AMS TECHNOLOGIES □ 182

11.2.6 □ ANGSTROM ENGINEERING □ 182

11.2.7 □ BENEQ □ 183

11.2.8 □ ENCAPSULIX □ 183

11.2.9 □ LOTUS APPLIED TECHNOLOGY □ 184

11.2.10 □ BASF □ 184

11.2.11 □ HOLST CENTRE □ 185

11.2.12 □ SNU PRECISION □ 185

11.2.13 □ KYORITSU CHEMICAL & CORPORATION LIMITED □ 186

11.2.14 □ SAES GETTERS SPA □ 186

11.2.15 □ MBRAUN □ 187

\*Details on Business overview, Products offered, Recent Developments, MNM view might not be captured in case of unlisted companies.

12 □ APPENDIX □ 188

12.1 □ DISCUSSION GUIDE □ 188

12.2 □ KNOWLEDGESTORE: MARKETSANDMARKETS' SUBSCRIPTION PORTAL □ 191

12.3 □ CUSTOMIZATION OPTIONS □ 193

12.4 □ RELATED REPORTS □ 193

12.5 □ AUTHOR DETAILS □ 194

**Thin-Film Encapsulation (TFE) Market by Application (OLED Display, OLED Lighting, and Thin-Film Photovoltaic), Deposition Type (Inorganic Layers (PECVD, ALD) and Organic Layers (Inkjet Printing and VTE), Vertical and Region - Global Forecast to 2027**

Market Report | 2022-11-10 | 190 pages | MarketsandMarkets

To place an Order with Scotts International:

- ☐ - Print this form
- ☐ - Complete the relevant blank fields and sign
- ☐ - Send as a scanned email to support@scotts-international.com

**ORDER FORM:**

Select license	License	Price
	Single User	\$4950.00
	Multi User	\$6650.00
	Corporate License	\$8150.00
	Enterprise Site License	\$10000.00
		VAT
		Total

\*Please circle the relevant license option. For any questions please contact support@scotts-international.com or 0048 603 394 346.

\*\* VAT will be added at 23% for Polish based companies, individuals and EU based companies who are unable to provide a valid EU Vat Numbers.

Email*	<input type="text"/>	Phone*	<input type="text"/>
First Name*	<input type="text"/>	Last Name*	<input type="text"/>
Job title*	<input type="text"/>		
Company Name*	<input type="text"/>	EU Vat / Tax ID / NIP number*	<input type="text"/>
Address*	<input type="text"/>	City*	<input type="text"/>

**Scotts International. EU Vat number: PL 6772247784**

tel. 0048 603 394 346 e-mail: support@scotts-international.com

www.scotts-international.com

Zip Code\*

Country\*

Date

Signature