Display Materials and Components Report - Glass Slimming 2013

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Overview

- This report is about technologies and industry forecast of glass slimming, a procedure used to reduce the glass thickness and weight after TFT LCD or OLED panels are made.

- This report deals with glass slimming of FPD such as TFT-LCD and AMOLED (backplane TFT / Encap. Glass) but excludes touch panel cover glass.

- Chapter I “Glass Slimming” provides an overview of the industry: What is glass slimming and why it is needed, and the increasing demand for thinner mobile devices.

- The glass slimming industry flows are briefly described, along with the analysis of potential risk factors.

- Chapter II “Glass Slimming Technology Trends” compares technologies, processes and methods, and analyzes major patents.

- Chapter III forecasts the display panel industry for mobile devices, tablet PCs and laptops, which are raising demand for glass slimming, and forecasts the glass slimming market, based on the prospective applications.

- Data on volumes is based on sheets of mother glass as glass slimming process is conducted on mother glass, or cut plates.

- Chapter IV analyzes glass slimming demand by major panel manufacturers such as Samsung Display, LG Display, AU Optronics and Innolux.

- Chapter V analyzes the glass slimming industry supply chains and market shares by panel makers, and deals with the market competition and outlook for South Korea and Greater China.

- Chapter VI deals with prices and costs

- This report analyzes price differences by region, glass size and equipment, as well as cost differences between single-side and double-side etchings and those between side spray and down spray methods.

- Glass slimming data in this report is about FPD panels, including On-cell Touch (OCTA) AMOLEDs and excludes data on touch panel cover glass.
I. Glass Slimming Industry

- I-1 provides an understanding of the glass slimming process through the description of glass slimming in the context of the display industry. It explains of reducing the thickness of panels, which is closely related to glass slimming, and describes the panel thickness of major mobile devices introduced in the market over the past one to two years.

- I-2 describes the flow of the glass slimming industry to give a better understanding of the overall glass slimming industry.

- I-3 takes a look at flexible display, which is regarded as a potential risk factor to the glass slimming industry, and the thickness reduction of the mother glass sheet, and their impacts on the glass slimming industry.
I-1. Glass Slimming Introduction

• Slimness and lightness are key competitive factors of consumer IT devices that use flat panel displays such as TFT-LCD and OLED. Display makers are responding to market changes by slimming down the glass substrate used in consumer goods as part of an effort to reduce the weight and thickness of finished goods, while finding ways to select the less heavy hardware at the same time.

• Reducing the thickness of a glass substrate to cut its weight has proven to be the most effective way to make a flat panel display thinner and lighter. However, if a glass substrate used in the TFT or cell manufacturing process starts off as a thin sheet, it runs into many difficulties because of the variables arising from the LCD module, or OLED manufacturing process. Thus, it is essential to slim the glass substrate through chemical and physical methods at the time when the cell production process is completed. This process is called glass slimming.

• The glass slimming industry requires both chemical materials and process technologies. The glass slimming process can be divided into a chemical etching method, in which the glass substrate of laminated LCD panels is chemically etched after TFT process and color filter process are completed, and a physical polishing method. The general trend these days is moving towards chemical etching, and this is why developing the etching solution is the core technology for glass slimming. Moreover, there is also the need for a high level of expertise in the overall process to maintain a high level of film uniformity, light transmittance, and color realization, therefore this industry has a high entry barrier.
I-1. Glass Slimming Introduction

- Demand of OLED and LCL panels for IT products is forecast to grow continuously with a rapid growth of mobile devices such as smartphones and tablet PCs. There is increased demand for slimmer and lighter displays, with transportability being the most important factor for mobile smart applications. Moreover, to achieve an even clearer image quality for ultra laptops such as ultra light and ultra slim laptops, the industry is increasingly opting for displays that are apply with glass slimming technology.

- As such, although glass slimming involves high production costs, there are growing needs for glass slimming in line with rising demand for mobile devices, especially smartphones and tablet PCs, and for lightweight laptop panels.
II. Glass Slimming Technology Trends

- Deals with the glass slimming process, comparisons by process methods and relevant patents.
- II-1 describes the glass slimming technology.
- II-2 explains the glass slimming process and the main material used, hydrofluoric acid.
- II-3 compares and analyzes the widely used glass slimming processes
- II-4 analyzes major related patents
II-1. Glass Slimming

- Glass slimming is a method to reduce thickness of the glass substrate used in LCD and AMOLEDs, flat panel display devices. It refers to the processes of producing a thinner display panel either through chemical etching of a glass substrate, or chemical mechanical planarization (CMP) after the TFT and color filter processes are completed.
- Currently, it is the only technology to slim the glass substrate used in flat display panels down to 0.4–0.6mm, based on TFT array and color filter panels: As for display panels with two 0.5–0.63mm substrates, the panel is reduced to 50% through etching and CMP process.

(Source: Soulbrain)
II-4. Glass Slimming Patent


- Samsung Corning Precision Materials and foreign companies, including Corning Incorporated, Asahi Glass Co. Ltd. and Nippon Electric Glass Co. Ltd. (NEG), dominate display glass production, but South Korean companies have an upper hand in glass slimming. This report will take a look at the patents related to glass slimming technology.

- In the ultra slimming process development for glass substrates used in flat displays, South Korean companies have made great progress. In particular, there are many patent applications for glass substrate etching apparatus and etching methods, including etching solutions.

- For glass etching technologies for use in display panels, there are many patent applications by actual glass slimming companies. They are making aggressive investment in developing and securing relevant technologies.

- South Korean companies are at the forefront of glass slimming process technology for use in display panels, in general. They seem competitive in patents of process technologies such as etching, equipment, chemicals.

  Analysis of major patents of top South Korean glass slimming companies
  - Patents related to glass slimming equipment and instruments such as transportable cassette and zig.
  - Patents related to glass slimming methods such as side spray and down spray
  - Patents related to recycling and filtering chemicals used in glass slimming process

  - Patents related to chemicals used during the processes are applied by the former Techno Semichem Co. Ltd., recently renamed to Soulbrain Co. Ltd.
III. Demand Analysis: Global Market

• Chapter III forecasts panel shipments for use in small-and medium-sized displays such as smartphones, tablet PCs and laptops to assess the glass slimming demand and analyzes the weighting of each application in the glass slimming process.

• Glass slimming data in this report is about flat panel displays, including on-cell touch AMOLED (OCTA) and excludes data on the touch panel cover glass.

• Chapter III-1–3 breaks down the glass slimming demand forecasts by panel types for small-and medium-sized displays such as smartphones, tablet PCs and laptops. The whole glass slimming demand forecast is based on the data.

• The panel market forecast for each application is based on mother glass sheets by generation.

• Glass slimming demand is forecast on a semiannual basis from 2012 to 2016, and the market size estimates are based on mother glass sheets.

• Market size estimates in value reflect the price differences among regions, companies and glass slimming methods, and take into account the current downward trend of prices by region.

• Chapter III-4 forecasts market sizes by region and by application, based on the data from chapter III-1–3.
III-3. Laptop Display Industry

III-3-3. Glass Slimming Market Forecast: Number of Sheets

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IV. Demand Analysis: Major Panel Manufacturers

• Chapter IV analyzes the glass slimming demand by Samsung Display Co. Ltd., LG Display Co. Ltd., AU Optronics Corp. and Innolux Corporation.

• The glass slimming data in this report refers to glass slimming for flat panel displays (FPD), including OCTA. Glass slimming data on touch panel cover glass is excluded.

• All data only takes account of the volume of outsourced processes, therefore data on in-house processes for some companies is excluded.

• Demand estimates are based on production forecasts for the companies’ manufacturing lines and the analysis of glass slimming demand by application.

• Glass slimming market value estimations reflect the current prices of the companies.

• The market value forecasts through 2013 are based on the prices provided by the companies.

• The projected value from 2014 onward is based on the assumption that prices will decline about 3–5% every half-year, given that the glass slimming market undergoes price negotiations every half-year.

• The pace of price falls will differ by region. In particular, the Taiwanese market is expected to experience a faster rate of decline in prices considering its high glass slimming costs.
Chapter V. Competition Analysis

• Chapter V deals with the competition situation in the glass slimming industry in South Korea and Greater China through the analysis of supply chains and market shares.

• In the supply chain analysis, the business situation of major panel makers and glass slimming companies in each region was reviewed, based on the second quarter of 2013.

• Market share data is based on shares by major panel makers in 2012.

• The market share data in this report only deals with the volume of outsourced processes, excluding the volume of in-house processing.

• This chapter analyzes the current business conditions in glass slimming companies and their prospective changes by region and panel maker.
Chapter VI. Price and Cost Analysis

• Chapter VI analyzes glass slimming prices, or processing costs and production costs.

• VI-1 deals with prices by region, by company, and by process method.

• VI-2 analyzes the cost differences between double side and single side etchings, and the cost differences between side spray and down spray methods.
About Displaybank - Global Operations

- Global leader in Display industry research and consulting services
- With over 10 years of industry-wide research experience, Displaybank provides market intelligence as well as technical research to industry leaders
- Besides end-user market, especially strong in the Component/Material research that is basis of the overall display industry
- Headquartered in Korea, the region known as the leader in display industry, Displaybank operates regional offices in Japan, China, Taiwan and the US.

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Our ‘Teardowns’ offers hot issue products’ technology, structure, cost, and major components’ SCM and profitability analysis of the market. Through the analysis of products, you will be able to get useful information on customers’ new product planning, comparison with competing product, and cost/profitability analysis.

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Provide key information including, technology trends, market forecasts, production capacity, and cost analysis on LED’s epi, chip, package, and all aPhoto Spacer across the value chain, and also offers information on LED lighting’s market forecast and standardization trends.

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**Material**
Provide market, industry, and business information on 10 process and chemical materials (Photo Resist, Liquid Photo Spacerystal, Gas, Etchant, Stripper, Developer, Color Resist, Photo Spacer, Overcoat, Photo Spacer) used in LCD manufacturing, and also information on issued-materials and technology such as metal layer.

**New Technology**
Provides development and business trends, and market forecasts on next-generation display such as, flexible display, transparent display, 3D display, and next-generation technology such as, graphene, Oxide TFT, flexible substrates, and printed electronics technology.

**Patent**
Provide patent trends and analysis information related to display, LED, and touch panel, and also offers patent analysis on the dispute (e.g. iPhone multi-touch), products (e.g. Toshiba no-glasses 3D TV), and technology (e.g. graphene).