

August 23, 2017

Toyobo to set up joint venture with Nagase to produce and sell heat-resistant film with world-class dimensional stability for displays and sensors

Toyobo Co., Ltd. will next year start manufacturing and selling XENOMAX[®], a heat-resistant polyimide film whose dimensional stability is among the world's best for this kind of film, by setting up a joint venture company with Nagase & Co., Ltd. and building a plant in Toyobo's Tsuruga Research and Production Center in Fukui Prefecture. The product's dimensional stability is equivalent to those of glass and silicon wafers.

XENOMAX[®] will be produced and marketed for use in organic electroluminescence (OLED) and other flexible displays and sensors, in addition to electronic paper displays, for which manufacturers have already adopted the product as an electronic circuit substrate material.



Polyimide film "XENOMAX[®]"

1. Polyimide films: Heat-resistant polymer films with insulation properties

Polyimide film is a kind of polymer film that has a robust molecular structure. Thanks to its highly heat-resistant and insulation properties, they have been used as insulation films, mainly for electronic circuit substrates.

Thin-film transistors (TFT) and other electronic circuits for use in displays and sensors have conventionally been built on glass materials, because the substrates must withstand the high temperatures involved in the manufacturing process. Displays and sensors have become

lighter, thinner and more flexible in recent years, prompting a surge in demand for thin, easy-to-bend polymer films on which electronic circuits can be built. Such polymer films must be heat-resistant and dimensionally stable, which means they do not deform, shrink or stretch when subject to the same level of heat for making TFTs on glass substrates.

2. XENOMAX®: Heat-resistant polyimide film with world-class dimensional stability

With a coefficient of thermal expansion (CTE) of about 3 ppm/°C in environments ranging from room temperature to as high as 500°C, XENOMAX® has a dimensional stability that ranks among the best in the world for a polyimide film. To achieve this, Toyobo fused a technology developed by the Michigan Molecular Institute (a U.S. research facility), for which it holds the exclusive license, with Toyobo's own technologies to synthesize heat-resistant polymers and make films. The resultant new technology is capable of making a polyimide film that has the dimensional stability equivalent to that of glass substrates, a feat long considered to be impossible. Toyobo's research arms, mainly the Corporate Research Center, succeeded in commercializing the product, which is used as a substrate on which a TFT is built, while subject to temperatures ranging from 400°C to 500°C. The product has been manufactured at a pilot plant at the Corporate Research Center, and used as a TFT substrate for electronic paper displays.

3. XENOMAX® Strategies

Toyobo will establish a joint venture company with Nagase to manufacture and sell XENOMAX® in the first half of fiscal 2018, while setting up a plant to manufacture the product at Toyobo's Tsuruga Research and Production Center. The product will be marketed in response to growing demand for TFT substrates to be used in electronic paper displays. The thin, light, bendable and virtually unbreakable XENOMAX® films are excellent substrate materials that can replace those made of glass, silicon wafers and ceramics—including TFT substrates for flexible OLED and sensors. Toyobo aims to expand their sales in these areas.

In collaboration with Nagase, Toyobo aims to swiftly create a ¥10 billion business by responding to high demand for highly functional, heat-resistant films.

Outline of joint venture

Name of company: Yet to be decided

Location: 10-24 Toyochō, Tsuruga City, Fukui Prefecture, Japan (inside Tsuruga Research and Production Center, Toyobo Co., Ltd.)

President: Yet to be decided

Capital: ¥3.4 billion

Stakes: Toyobo 66.6%; Nagase 33.4%

Number of employees: About 40 (provisional)

Establishment: Scheduled for April 2018

Business operations: Production and sales of polyimide film XENOMAX®

Outline of plant to be built

Location: Same as the joint venture above

Area: Total floor space of about 4,300 square meters

Structure: Steel frame

Number of stories: Two (Five-story in part)

Start of construction: Scheduled for December 2017

Start of operation: Scheduled for October 2018

Investment amount: About ¥3 billion



Rendering of New Plant of “Xenomax®”

Outline of Nagase

Trade name: Nagase & Co., Ltd.

Original founding: June 18, 1832

Establishment: December 9, 1917

President & CEO: Kenji Asakura

Main business operations: Domestic sales, import and export of chemical products, synthetic resins, electronic materials, cosmetics and health food.

***Glossary**

*1: Dimensional stability: The degree to which a substance (material) maintains its original dimensions (length and width) even when subjected to rising temperatures. It is described mostly by the coefficient of temperature expansion.

*2: Coefficient of temperature expansion: The index of dimensional stability. The lower the value, the higher the stability.

For more information, contact:

Public Relations Group, Corporate Communication Department, Toyobo Co., Ltd.

Email: pr_g@toyobo.jp