

ULVAC COATING CORPORATION (ULCOAT) is one of the world's few manufacturers of mask blanks*¹. Its head office and factory are in Chichibu, a city in Saitama Prefecture that is well known for hosting one of Japan's top three festivals that feature floats: the Chichibu Night Festival*². In close partnership with its nearby subsidiary FINE SURFACE TECHNOLOGY CO., LTD. (FST), ULCOAT produces high-quality leading edge mask blanks. In 2001, the company also set up a manufacturing hub in Taiwan as a part of its active overseas business expansion.

For this edition's VISITING ULVAC, we interviewed Yoshinori Gonokami (President and CEO of ULCOAT) and Hiroyuki Nawa (President and CEO of FST) to learn more about their current operations and their future prospects.



Yoshinori Gonokami, President and CEO of ULCOAT (left)
Hiroyuki Nawa, President and CEO of FST (right)

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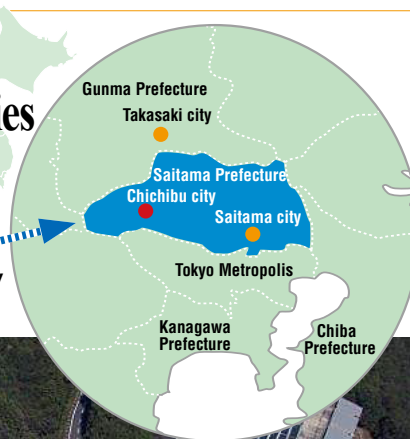
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Companies with Roots in their Local Communities Underpin the Global Manufacturing of Semiconductors and FPDs

—A passion for delivering a stable supply and outstanding quality through comprehensive quality control





Exterior view of the ULCOAT site

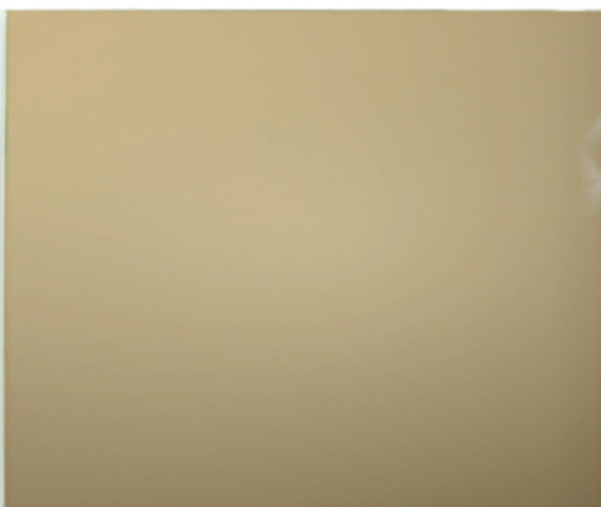
Introduction

ULCOAT is a spin-off company of Japan Vacuum Engineering Co., Ltd. (now ULVAC, Inc.) that was established in 1979 with about 50 employees transferred from the SI Department to the site of ULCOAT's current head office and factory in Chichibu. The company carried on the SI Department's mission of manufacturing and selling hard mask blanks and transparent conductive films for liquid crystal displays. At that time, they not only sold the equipment that they manufactured, but also attempted to create new products using their self-manufactured small deposition devices and sputtering devices with the aim of expanding the business applications for their technologies. Through these efforts,

the company has been able to make a significant contribution to the miniaturization of integrated circuits, as exemplified by the pioneering development of mask blanks made using low-reflection chromium film in 1972. ULCOAT was established with the intention of scaling up these new lines of businesses.

Today, the company manufactures and sells large mask blanks for displays (e.g., LCDs and OLEDs) that boast nearly 60% of the global market, glass MEMS, along with mask blanks for the semiconductors that have been our core products since our establishment.

As of December 2016, the company has capital of 100 million yen and 190 employees.



Large mask blanks



Mask blanks for semiconductors (top)
Each glass substrate sheet is visually inspected in a dark room to check for scratches (bottom)

*1 Mask blanks

Mask blanks are finely polished glass substrates coated with a light-shielding film (e.g., chrome) and a photosensitizing agent (resist). To fabricate a photomask, the circuit pattern is drawn using an electron-beam writer or another such device and the exposed area is then removed and etched.

Large mask blanks expected to boost market share



Yoshinori Gonokami
President and CEO
ULVAC COATING CORPORATION

We expect demand for our products used in the production of semiconductors to grow in the wake of a further boost in sales driven by the application of semiconductors in relation to the Internet of Things (IoT) and artificial intelligence (AI). In particular, we aim to actively expand our market share by enhancing the quality of ArF and KrF phase-shift mask (PSM) blanks intended for the high-end market.

We will proactively pursue the development of large mask blanks to increase our market share of PSM blanks for high definition displays, along with for semiconductors. In China, the demand for large mask blanks is expected to grow in line with surging investment in OLEDs, and we are determined to seize the opportunity that this presents.

Expanding capital investment in the group-wide pursuit of enhanced technologies and quality

At present, ULCOAT produces mask blanks mainly for general-use semiconductors. The company is expanding its investment in equipment and human resources with the aim of making further inroads into the high-end market and increasing its share from its currently low level.

A project for improving product quality was launched in 2014, and this project was taken over by the re-established Research & Development Division in 2016. In partnership with ULVAC, ULVAC Tohoku, ULVAC Techno, and other group companies, another project was undertaken to deliver the world's highest level of quality in mask blank manufacturing. A group-wide effort will be made to boost product quality.

ULCOAT is able to produce one of the world's largest mask blanks (2,100 mm by 2,600 mm), and its blanks are commonly used in LCD process. The company leads the world in the manufacture of large mask blanks owing to its ongoing development and capital investment aimed at producing ever larger products.

In keeping with the globalization of the display business, ULCOAT Taiwan Inc. (ULT) was established in 2001 to serve as a production hub for the Asian market. This move was also intended to stabilize supply through the operation of two production hubs: one in Japan and one in Taiwan. Plans are underway to proactively pursue further capital investment in Taiwan.

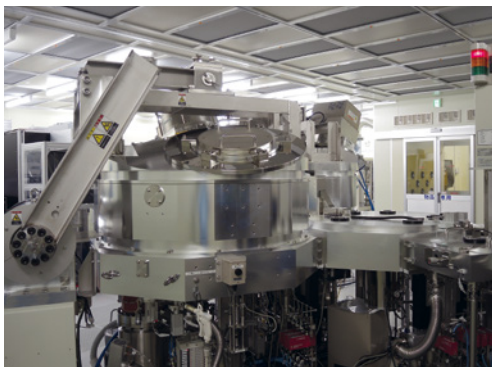
An open corporate culture delivers performance transparency and better employee mindsets

Every day, ULCOAT discloses its financial statements internally. All of its employees are able to view the sales and profits from the previous day and their forecasts for the same month through this system. This system was implemented in accordance with the policy of Gonokami, ULCOAT's president and CEO, who felt that it was important for all employees to understand the company's financial standing and business challenges. FST and ULT also disclose its financial statements to employees on a weekly basis. At the beginning of every month, each of these three companies organizes an "open meeting" at which their president explains directly to the employees the company's financial state and how their manufactured products are being used in end products. Employees who rarely have an opportunity to leave their work sites listen attentively to these presentations, which have been found to lead to reduced costs and greater motivation among employees.

Furthermore, each employee is encouraged to make two improvement proposals a month. A survey is carried out as part of the company's tireless efforts to improve the mindsets of its employees. In this way, ULCOAT remains committed to pursuing a goal that seems obvious but is, in reality, difficult to achieve: the provision of reliable products that customers can use without any cause for concern by improving product quality and the attitudes of individual employees.

Invigorating employees and the community through local activities

On December 2 and 3 every year, a night festival is held in Chichibu, a city in Saitama Prefecture where the company's head



Sputtering equipment for forming chromatic and other types of film on substrates



Sputtering equipment



Cleaning equipment



Exterior view of the FST site

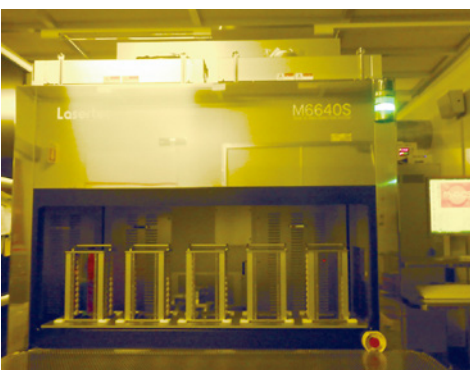
FINE SURFACE TECHNOLOGY CO., LTD. (FST)

FST was originally a polishing company headquartered in Hiratsuka, Kanagawa Prefecture. The company established an office and factory in Chichibu, Saitama Prefecture, in 1979 following the establishment of ULCOAT there. Its headquarters were relocated to Chichibu in 1985, and the company became a wholly owned subsidiary of ULCOAT in 2005. At present, the company performs precision polishing of glass materials to make substrates for mask blanks and blasting of sputtering parts. Their products are mostly supplied to ULCOAT. As of December 2016, the company has capital of 10 million yen and 85 employees.

office and factory are located. The festival is famed for its ornate floats lanterns decorations that make their way around the city for two nights to the accompaniment of drum and flute music. The largest float is 15m tall and weighs 20 tons!

The winter fireworks festival is another attraction that accompanies the Chichibu Night Festival. At this festival, which is co-sponsored by ULCOAT, starmine fireworks are launched one after another for two and a half hours.

Every year, ULCOAT and FST jointly organize a sports festival at a gymnasium located in the city to foster employee integration. The next one will be the seventh such festival. Many couples and children enjoy participating in this popular event. Gonokami has said that he is glad to see smiles on the faces of the company's employees and their families as they enjoy the festival.



A defect inspection system for mask blanks



Potekuma-kun, a cross between a potato (the city's local specialty) and a bear that serves as Chichibu's mascot and brand ambassador, also joined the sports festival.



Children playing a game that involves tossing balls into a net

Future Vision

Evolving from being just a polishing company to pursuing new added value as a manufacturer



Hiroyuki Nawa
President and CEO
FINE SURFACE TECHNOLOGY CO., LTD.

FST is single minded in its pursuit of the elimination of defects and the creation of a perfectly flat surface. The flat surface of a photomask material that has been polished using FST's proprietary technologies has an flatness of as little as 0.3 μm or less. If we scale this flatness up to the entire area of Dubai UAE, the height difference would be a mere 12 cm.

Given this, our polishing technologies are clearly some of the best in the world. We aim to expand our sales channels by leveraging these core technologies. Furthermore, with a view to evolving beyond being just a polishing company, we are working to add new value as a manufacturer.



*2 The Chichibu Night Festival is the main event of the annual festival held at the Chichibu Shrine. With a history stretching back over 300 years, this festival is one of Japan's top three festivals that feature floats (the other two being the Gion Festival in Kyoto and the Takayama Festival in Hida). On December 1, 2016, the festival was designated by UNESCO as intangible cultural heritage.