FORWARD-LOOKING STATEMENTS
Forward-looking statements such as those relating to earnings forecasts and other projections contained in this material are management’s current assumptions and beliefs based on currently available information. Such forward-looking statements are subject to a number of risks, uncertainties, and other factors. Accordingly, actual results may differ materially from those projected due to various factors.

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Fujifilm’s strength

Capability to develop new technologies and technologies to permit stable manufacturing

Corporation between FUJIFILM Advanced Research Laboratories and Electronic Materials Research Laboratories, that specialize in EM business

Work for “technology development” and “stable manufacturing” by utilizing Fujifilm’s development structure
A field where Fujifilm’s technological strengths can be utilized: Semiconductor materials

Semiconductor materials, one of the highly functional materials, is a field where Fujifilm’s strengths in the “development of fundamental technologies/creation of new core technologies” can be utilized.

Fujifilm and EM Business

Group synergies
Business is conducted globally under the cooperation between Fujifilm’s EM Div. and FFEM.

Cooperation structure to demonstrate group synergies
# About FUJIFILM Electronic Materials (FFEM)

## History of the business

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>Fuji-Hunt Electronics Technology, established as a joint-venture company between Fujifilm (FF) and Philip A. Hunt Chemical Corporation (currently Arch Chemicals), started the manufacture and sales of IC photoresists and such related products as developers in Japan and elsewhere in the East Asia region.</td>
</tr>
<tr>
<td>1988</td>
<td>FUJIFILM Electronic Materials (FFEM) started the business of color resists for LCDs, receiving patent rights from FF.</td>
</tr>
<tr>
<td>1991</td>
<td>FF started R&amp;D of photoresists for semiconductors.</td>
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<tr>
<td>1996</td>
<td>FFEM established a manufacturing subsidiary in Taiwan.</td>
</tr>
<tr>
<td>2000</td>
<td>FFEM established a subsidiary in South Korea.</td>
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<tr>
<td>2003</td>
<td>FF established a laboratory for semiconductor materials.</td>
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<tr>
<td>2004</td>
<td>FFEM became a 100%-owned subsidiary of FF while FF purchased the major part of the Microelectronic Materials Div. of Arch Chemicals (a manufacturing base in Europe/U.S.A. and a sales base in Europe/the U.S.A./Asia)</td>
</tr>
<tr>
<td>2005</td>
<td>FF established the Electronic Materials Div. Purchased 50% of stocks in Planar Solutions, a joint-venture company in the CMP slurry business between Wacker and Arch Chemicals, from Arch Chemicals.</td>
</tr>
<tr>
<td>2006</td>
<td>Integrated the development function of FFEM with FF’s laboratory for semiconductor materials and renamed it as the Electronic Materials Laboratory (reinforcement of the business). Established a manufacturing subsidiary in China.</td>
</tr>
<tr>
<td>2008</td>
<td>Purchased ArF immersion-litho equipment.</td>
</tr>
<tr>
<td>2010</td>
<td>Made Planar Solutions, a manufacturing/sales company of CMP slurries, into a 100%-owned subsidiary.</td>
</tr>
<tr>
<td>2012</td>
<td>Established a manufacturing subsidiary in South Korea.</td>
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</tbody>
</table>
Photoresists are indispensable for the manufacturing of ultrasmall circuit patterns. This photopolymer is used in the microphotolithography process, where the circuit pattern is printed onto a silicon wafer via exposure to light.

**Pattern formation by lithography technology**

- **Creating photomasks**: A base used when transcribing circuit patterns to photoresist.
- **Applying photoresists**: Apply photoresist to silicon wafers.
- **Exposing light**: Print mask patterns on photoresist.
- **Silicon wafer**
- **Photomask**
- **Etching**: Cut out parts that are not protected by photoresist.
- **Developing**: Melt photoresist that has been exposed by using developer.
- **Immerse in developer**
- **Note**: As in the case of positive resist
Photoresists - Leading-edge technologies -

New technologies are used to meet the needs for the further miniaturization of circuit dimension.

ArF immersion
A technology for increasing the resolution by filling the space between the stepper lens and the wafer with water that has a higher refractive index than air. This makes possible micro-processing without changing the light source or the photomask.

Top coat less
In the case of immersion, a topcoat is necessary to prevent elution into the water contained in the resist. With “top coat less” technology, the need for a topcoat is eliminated at the time of the exposure because polarity conversion technology changes the hydrophobic resist surface to a hydrophilic surface when development takes place.

Negative tone imaging (NTI)
Uses negative developing, a system that the exposed part is left. It realizes further miniaturization compared with the positive developing system, while shorting tact-time through its high sensitiveness.

Materials for image sensors

Color resists
A photo-sensitized coloring material to manufacture micro color filters, used in image sensors

Products that use image sensors

Back-end materials and others

**CMP (chemical mechanical polishing) slurry**
An abrasive material used to planarize the substrate that has various materials in the circuit structure, like metal or dielectrics, to the ultimate level.

**Planarization**
Abrasives and planarize the rough field of a wafer.

**Forming wiring**
Form electrode wiring after removing photoresist.

**CMP process**
- Head pressure
- Wafer (upside down)
- Rotating head
- CMP slurry
- Polishing pad
- Rotating platen

**Photoresist products for photomask fabrication**
- A specialized resist used for manufacturing photomasks.
- Light source
- Photomask
- Lens
- Printed pattern
- Water

**Photomask**
A yardstick of miniaturization

1m
1mm
1μm
1nm

As miniaturization proceeds, such foreign substances as dust easily lead to trouble with products.

⇒Highly developed technologies are needed to maintain high quality.
Trend of photoresist industry

There are numerous next-generation technology candidates to promote miniaturization, but uncertainty still remains.

### Practical uses

<table>
<thead>
<tr>
<th>45nm</th>
<th>Light source 193nm</th>
<th>Immersion</th>
</tr>
</thead>
<tbody>
<tr>
<td>32nm</td>
<td>Light source 193nm</td>
<td>NTI, Double-patterning</td>
</tr>
</tbody>
</table>

Technologies to realize further miniaturization are needed.

### Next-generation technology candidates

<table>
<thead>
<tr>
<th>Year</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015~</td>
<td>Light source 193nm Multi-patterning, EUV, Mask-less lithography, Nanoimprint</td>
</tr>
<tr>
<td>2018~</td>
<td>Light source 193nm Multi-patterning, EUV, Mask-less lithography, Nanoimprint, Directed self assembly (DSA) + lithography</td>
</tr>
<tr>
<td>2021~</td>
<td>EUV, EUV + multi-patterning, Mask-less lithography, Nanoimprint, DSA + lithography</td>
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</tbody>
</table>

Note: source from ITRS road map

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Advantages of the Business

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Advantages of FFEM

Special features of FFEM

1) Development of advanced highly functional materials
   - Fundamental technologies: Capability to design and synthesize organic chemical compounds/polymers (in corporate laboratories)
   - Capability to develop products: Grasp customer needs and design/develop with speed and accuracy (on-site sales and divisional laboratories)

2) Stable supply of leading-edge products Incident Free (No HVM issue)
   - Stable and consistent manufacturing (control performance of raw materials / management of manufacturing process)
   - Quality assurance (QA)/quality control (QC) (action against change in daily performance = pursue cause of disordered data, while swiftly/accurately reacting when troubles arises)

3) Wide range of leading-edge high-value-added global products that meet customers’ demand
   - ArF resists, CMP slurries, cleaners/etchants, thin films

4) Win-win relationships with priority customers (achieve reliance from customers)
   - Support commitment from the whole company, including top management, to R&D, manufacturing, QA/QC, and sales (including on-site)

5) Global manufacturing and supply network and joint development structure

Establish win-win relationships by continuing the cycle below

Customer needs ➔ Reliance by grasping customer needs ➔ R&D ➔ Customer reliance by offering samples ➔ Manufacturing ➔ Request for development of future products ➔ Customer reliance by swift/accurate reaction ➔ Change in daily performance ➔ Customer reliance by stable supply

Advantages of the Business

Advantages of FFEM

Growth Strategies

- Develop highly functional materials in a wide field using advanced technology developments
- Contribute to the development of the semiconductor industry by building win-win relationships with customers

Main Products with Growth

1. Photoresists
2. COLOR MOSAIC for Image Sensors (ISC-MOSAIC)
3. CMP Slurries
4. Etchants/Cleaners
5. Thin-Films
Advantages of FFEM

Main Products with Growth

<table>
<thead>
<tr>
<th>Products</th>
<th>Growth Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Photoresists</td>
<td>Appeal to such distinctive technologies as NTI, which was originally developed, and introduce leading-edge ArF photoresists to major customers</td>
</tr>
<tr>
<td>② IS-CM</td>
<td>Reinforce process support to existing customers and contribute to improving customers’ manufacturing efficiency</td>
</tr>
<tr>
<td></td>
<td>Maintain high market share by preventing competitors from entering the field</td>
</tr>
<tr>
<td></td>
<td>Expand business field through such new products as image sensor related materials</td>
</tr>
<tr>
<td>③ CMP Slurries</td>
<td>Expand the market by promoting on-site business (manufacturing/sales support) while specializing in the development of leading-edge slurries by</td>
</tr>
<tr>
<td></td>
<td>utilizing Planar Solution’s technologies, cost-competitiveness, and sales capabilities</td>
</tr>
<tr>
<td>④ Etchants/ Cleaners</td>
<td>Swiftly develop and supply products that satisfy customers and match the development of circuit patterning materials, accompanied by the progress of</td>
</tr>
<tr>
<td></td>
<td>semiconductor devices, through the reinforcement of cooperation with customers</td>
</tr>
<tr>
<td>⑤ Thin-Films</td>
<td>Develop ultra-miniaturization materials by making the most of compound designing technologies and refining technologies used for ultra-Low-k and</td>
</tr>
<tr>
<td></td>
<td>High-k</td>
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</tbody>
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Photoresists

Specialize in such leading-edge materials as ArF immersion photoresists

• Specialize in the development of advanced photoresists and expand business in ArF immersion/top coat less (TCL) photoresists
• Achieved high market share in leading-edge materials for ArF immersion and TCL photoresists

- Advantages of the Business
  • Further raise customer satisfaction with on-site service
  • Utilize technologies that realize high quality, stable supply, and high-volume manufacturing (analysis technologies and synthesis technologies)

- Future Measures
  • Introduction of NTI
    ⇒ Compared to conventional positive developing, NTI can ① react to miniaturization and ② has a shorter tact-time owing to high sensitivity
  • Differentiate product performance in existing ArF immersion photoresists
    ⇒ Realize compatibility through low defect and high scanning capabilities, adding to the distinctive TCL technology
COLOR MOSAIC for image sensors

Expand business by maintaining high market position

- Achieved high market share by launching products ahead of other companies
- Demand is expanding owing to such devices as smartphones and tablet PCs as well as conventional digital cameras.

Advantages of the Business

- Take advantage of microdispersion technologies of ultra-fine pigments and photopolymer technologies, developed in photoresist materials
- Succeed in developing environmentally friendly non-carbon black that realizes high shading effects and low reflection

Future Measures

- Reinforce process support to existing customers and contribute to improving customers’ manufacturing efficiency
- Maintain high market share by preventing competitors from entering the field
- Expand business field through such new products as image sensor related materials

Advantages of the Business

CMP slurries

Provide leading-edge CMP slurries for Cu and barriers

- Specialize in sales/development of leading-edge CMP slurries for Cu and barriers

Advantages of the Business

- Combine Fujifilm’s advanced technologies with Planar Solution’s leading-edge technologies for CMP slurries, including cost-competitiveness and sales capabilities

Future Measures

Further expand sales and market share of CMP slurries

- Reinforce measures to react to customers’ needs and improve transport efficiency by establishing manufacturing sites in South Korea and Taiwan
- Improve profitability by reducing transport costs

Equally/Smoothly planarize wafer surface that has a mixture of various substances with different hardnesses

Wiring and dielectrics with different hardnesses are combined

Wafer surface is planarized, despite the difference in hardness
Advantages of the Business

Etchants/Cleaners

Offer advanced materials that meet the progress of technologies

- Build relationships with major semiconductor manufacturing companies and offer materials that meet the needs of the customers' operations

Future Measures

- Swiftly establish and introduce material development/process capabilities that meet the daily development of circuit patterning materials, through cooperation with customers

As miniaturization proceeds, removing contaminants (the resin, metal, and other materials remaining after the wiring process that leads to defects) and further improving accuracy are becoming more and more necessary.

Contamination with the same size will become a critical problem as miniaturization proceeds.

Global Structure
Global Structure

[Global manufacturing structure] Flexible manufacturing structure from BCP and on-site

- Shizuoka, Japan
- Rhode Island, U.S.A.
- Arizona, U.S.A.
- Zwijndrecht, Belgium
- Hsinchu, Taiwan
- Suzhou, China
- Cheonan, Korea

**Photoresists**

**Developers**

**Resist Edge-Bead Removers**

- Polyimides
- Acid/Blends
- Strippers
- Thin Films
- CMP Slurries

**Developers**

- Polyimides
- Acid/Blends
- Strippers
- Thin Films
- CMP Slurries

**Resist Edge-Bead Removers**

- Polyimides
- Acid/Blends
- Strippers
- Thin Films
- CMP Slurries

**Newly Established**

- CMP Slurries

FUJIFILM Corporation