Functional Semiconductor Process Tape
ICROS™ Tape

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Mitsui Chemicals Tohcello, Inc.
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- Basic Information of ICROS™ Tape
- ICROS™ Tape Technology
  - Back Grinding (BG) Tape
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- Summary
Mitsui Chemicals Inc.

- **One of the largest chemical manufacturers in the world**
  - $13 billion in sales in fiscal 2017
  - Over 17,000 employees worldwide
  - Domestic: 5 manufacturing sites, 7 R&D Laboratories, 4 sales branches
  - Over 100 Subsidiary Companies.

- **Business Groups**
  - **Mobility**: Performance Compound, Elastomers, *Functional Polymers*
  - **Health Care**: Personal Care, Nonwovens
  - **Food & Packaging**: Agricultural Materials, *Films, Sheets, Tapes*
  - **Basic Materials**: Phenol, Petrochemicals

Mitsui’s Combination of Technologies

Mitsui Chemicals Tohcello, Inc
ICROS™ Tape
Mitsui’s target is not limited to Semiconductor. ICROS tape are already used in other areas.
ICROS™ Tape Technology
Back Grinding (BG) Tape
**Back Grinding Tape I**

### Tape TTV Control

- Excellent TTV Control (<2um)
- Precise Manufacturing Control

**Superior Total Thickness**

**High controlled TTV wafer**

Taping  >  Grinding  >  Detaping  >  TTV Check

<table>
<thead>
<tr>
<th>Tape</th>
<th>Conventional</th>
<th>Mitsui Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TTV Value</strong> *</td>
<td>9</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*12inch wafer TTV after taping and grinding to 75um

**Histogram**

![Histogram](image)
Back Grinding Tape II  Grinding WLCSP and fan-out wafer

Bump Encapsulation Technology

- Cover high topography (~300μm)
- Maintain No Residue Performance
- Varieties of Tape Design (≥20)

<table>
<thead>
<tr>
<th>Bump Image</th>
<th>Target Bump</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bump Type</strong></td>
<td><strong>Solder Bump</strong></td>
</tr>
<tr>
<td>Target</td>
<td>FlipChip BGA</td>
</tr>
<tr>
<td>Bump Image</td>
<td></td>
</tr>
<tr>
<td></td>
<td>120 μm</td>
</tr>
<tr>
<td>Tape Type</td>
<td>Base film</td>
</tr>
<tr>
<td>Intermediate layer I</td>
<td>Intermediate Layer II</td>
</tr>
<tr>
<td>Adhesive</td>
<td>Adhesive</td>
</tr>
</tbody>
</table>
ICROS™ Tape Technology
Dicing(DC) Tape
Transparent Dicing Tape

- High light Transmissivity
- Good wafer secured during Dicing
- Good expansion & pick up

Target Application:

1) Wafer backside Inspection

Chip Inspection through tape

- Good visibility

2) SD Through Tape

SD through Tape

- High Laser transmissivity
- Keep chip good with no damage
Heat Resistant Dicing Tape

- Heat Resistance (≤150 ℃)
- Good expansion after heating

Target Application:
Frame handling wafer level test

DC Tape property | Heat resistance | Expandability
--- | --- | ---
Conventional tape | ✓ | —
Heat resistant tape | — | ✓
Mitsui DC tape | ✓ | ✓
Heat Resistant Dicing Tape

- Dicing Property -
  Good Dicing property

- Heat Resistance -
  No Melting
  No Attaching to CT.

- Pick up ability -
  Good Expansion
  Good Pick Up ability

Dicing

Wafer level Testing

-15 °C to 150°C

Expansion & Pick up

Ring frame
Tape

Chip

WL-CSP

Mold Array Package

Conventional HR-DC tape

Chip Collision

Lift 5mm

Lift 15mm
ICROS™ Tape Technology
The Other Process Tape
Thermal release Tape

- Thermal Release Ability (≥ 190°C)
- Heat resistance (≤ 150°C)
- Satisfying Technical Requirements (No residue, Easy peel-off etc)

[Tape Construction]
- Liner
- Heat Resistant Adhesive
- Base film
- Thermal Release Adhesive
- Liner

[Feature]
- Substrate

Thermo Release

Target Application: **Self Release ability is necessary**

- **Wafer Level Package**
  - Mold Resin
  - Chip
  - Substrate
  - Tape

- **Thin wafer support**
  - Wafer
  - Substrate
  - Tape

- **Fragile surface handling**
  - e.g. MEMS Chip

Products can be released without any stress
Heat Resistant Bump Tape

- Heat Resistant (≤ 150 °C)
- Good bump encapsulation
- No residue after heating

Target Application

Wafer Backside coating process

- Bump wafer
- BG Tape Lamination
- BG
- Wafer back side coating
- Cure (<150°C)
- Detaping

Heat resistant

Good bump encapsulation

No Residue
Easy peel-off
High Heat Resistant Tape

- Heat Resistant (≤260 °C)
- Easy peel-off after heating
- No residue after heating

Target Application:

**Bumping reflow process with Tape**

- Ring frame
- Tape
- Wf

→ Plating (Wet, 80°C)

→ Bumping Reflow 260°C
High Adhesion tape

- Control adhesive strength
- Superior low contamination

Target Application:

**Dry Lift-off**

**<Dry Metal Lift-off process>**

- Resist pattern
- Metalizing

**Advantage of Dry Lift-off**

- Easy to collect precious metal like Au
- Saving of chemical and metal waste
- Short tact-time (vs Wet lift-off)
- No risk of surface damage (vs. Chemical Jet lift-off)

(Equipment: TAKATORI AMR2200G)
Summary
## Summary

ICROS™ Tape widely cover semiconductor and Electronic components packaging process

<table>
<thead>
<tr>
<th>Back Grinding Tape</th>
<th>Transparent DC tape</th>
</tr>
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<tbody>
<tr>
<td>(~ 250um Bump Encap. 1~2um TTV,)</td>
<td>(T : &gt;90%@visible light)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heat Resistant DC tape</th>
<th>Thermal Release Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>(150degC HR, with expandability)</td>
<td>(150degC HHR &amp; 190degC self release)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Heat Resistant and Bump Encap. Tape</th>
<th>High Heat Resistance Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>(150degC HR, ~ 250um Bump Encap.)</td>
<td>(260degC Heat Resistance)</td>
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</table>

<table>
<thead>
<tr>
<th>High Adhesion Tape</th>
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<tbody>
<tr>
<td>(Metal Lift-off by tape adhesion)</td>
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For detailed information, please visit our booth: Hall A4, Booth No. 1004