

# **Multiplying Throughput in Backgrinding and Wafer Processing with Novel Temporary Bonding Solutions**

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**AI Technology, Inc**

Wafer Processing Adhesives Webinar



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# Introduction

## Today's Presenters

- Robert Gelosa · Sales Engineer
- Amar Chauhan · Sales Manager

To learn more please go to:

**[aitechnology.com/products/wafer-processing-adhesives-and-solutions/](http://aitechnology.com/products/wafer-processing-adhesives-and-solutions/)**

Visit us on the web: **[www.aitechnology.com](http://www.aitechnology.com)**

Send us an email: **[ait@aitechnology.com](mailto:ait@aitechnology.com)**

Give us a call: **1-(609)-799-9388**

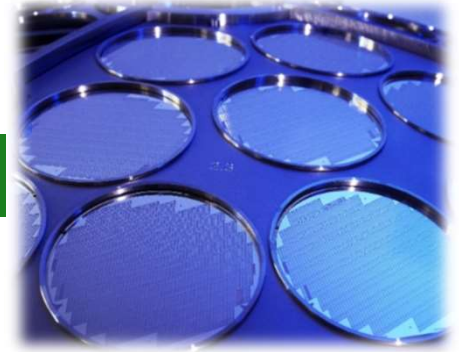


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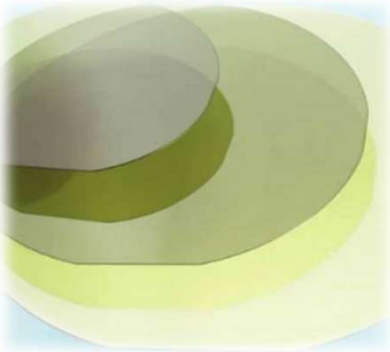
# Introduction

Two Distinct Processes

- Different Temporary Bonding Requirements



**Wafer Backgrinding + Wafer Processing**



**Wafer Backgrinding and Thinning**



# Introduction

Roadmap to today's presentation and topics

## Wafer Backgrinding + Wafer Processing

### Introduction to AIT Temporary Bonding Solutions

#### Motivations for Innovation

Background + Technology

Processing conditions

Temporary Adhesive: Bonding and Debonding

How AIT can multiply throughput

WPA-LD-350 Product Line

WPA-PRCL-350 & WPA-UVR-270

GD-PRCL-350 Product Line

**Novel Solutions from AI Technology, Inc**



## Wafer Backgrinding and Thinning

### Special Solutions for Special Material

Background

Requirements

Backgrinding Throughput

**Novel Solutions from AI Technology, Inc**

BGF7160 and BGF7090

WPA-PRCL-200

GD-BGF 7160 & GD-BGF 7090

GD-WPA-PRCL-300

# Presentation Roadmap

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Novel Solutions  
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AIT Technology,  
Inc



## Wafer Backgrinding and Thinning Special Solutions for Special Material

Background

Requirements

Novel Solutions  
from AIT Technology, Inc



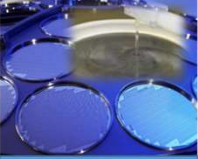
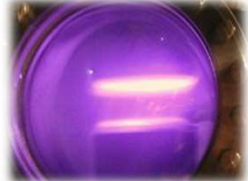
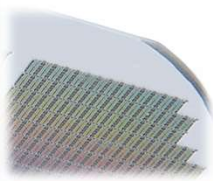

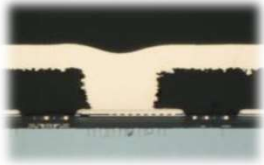
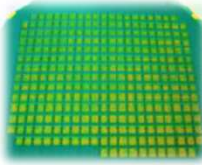
BGF7160 and BGF7090

WPA-PRCL-200

GD-BGF 7160 & GD-BGF 7090

GD-WPA-PRCL-300

# Wafer Processing and Backgrinding

		
Front Active Side Flip Over for Ultra-Thinning	High Shear Backgrinding and Polishing	Stress Relief Wet and Dry Etching
		
PECVD: 140°C-300°C	Oxide-Photoresist Dry Etching and Stripping	Oxide-Photoresist Dry Etching and Stripping
		
	Via Drilling, Seeding-Plating, Passivation (Up to 250°C), UBM	Finished Backside of Wafer



# Presentation Roadmap

## Wafer Backgrinding + Wafer Processing

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**Novel Solutions  
from  
AIT Technology,  
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## Wafer Backgrinding and Thinning Special Solutions for Special Material

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**Novel Solutions  
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WPA-PRCL-200

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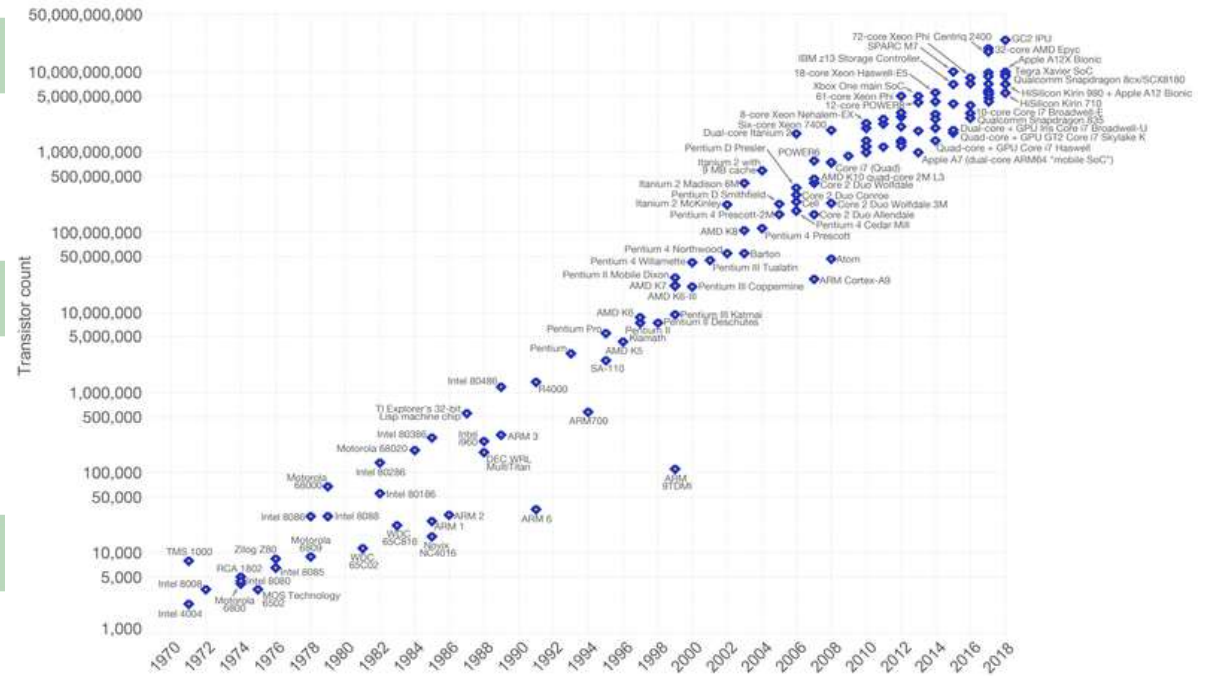
# Wafer Processing

What's motivating changes in wafer processing?

**Drivers for Advances**

**Beyond Moore's Law**

**Advanced Packaging**



Data source: Wikipedia ([https://en.wikipedia.org/wiki/Transistor\\_count](https://en.wikipedia.org/wiki/Transistor_count))  
The data visualization is available at OurWorldinData.org. There you find more visualizations and research on this topic.

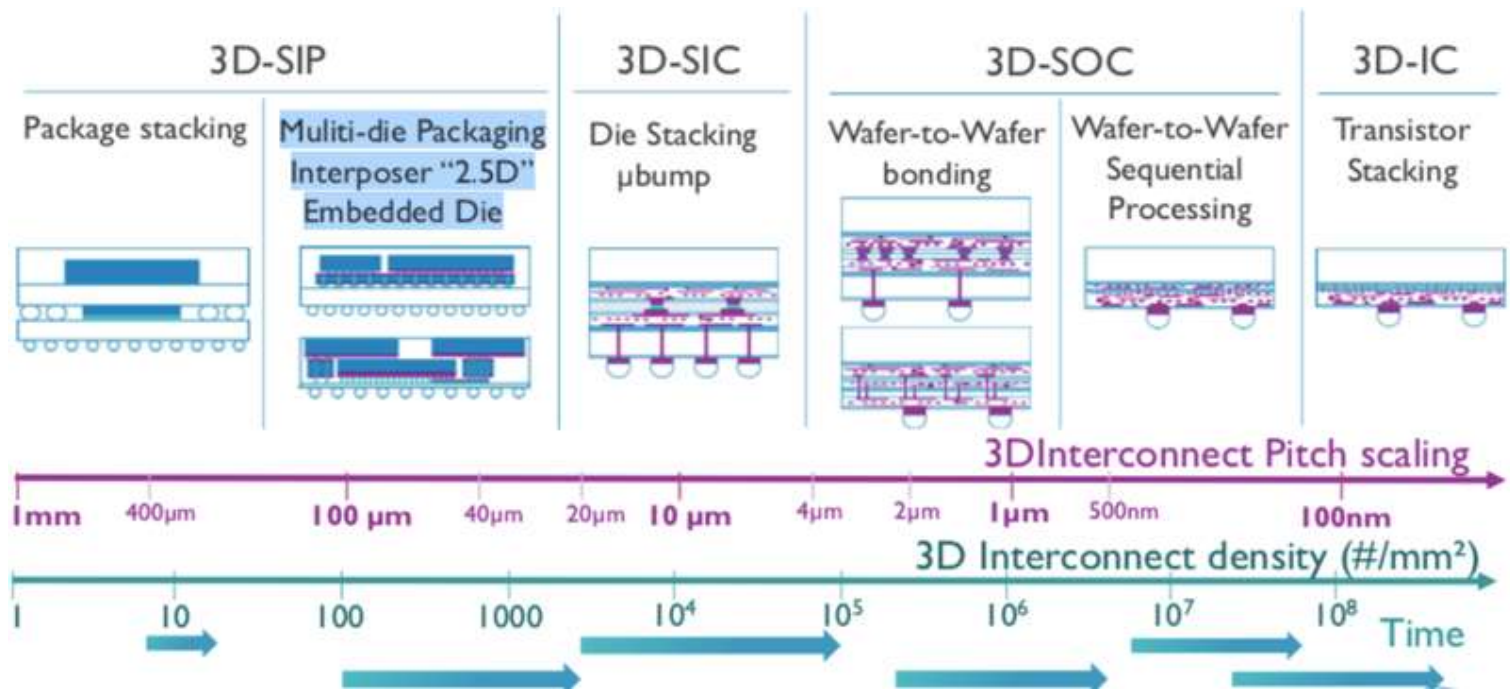
Licensed under CC-BY-SA by the author Max Roser.





# Wafer Processing

## 2.5 & 3D Packaging: IC Integration



<https://www.eenewsanalogue.com/news/backside-wafer-promises-3d-chip-improvements>



# Wafer Processing

## FOWLP: Size, Performance, Cost

### Performance

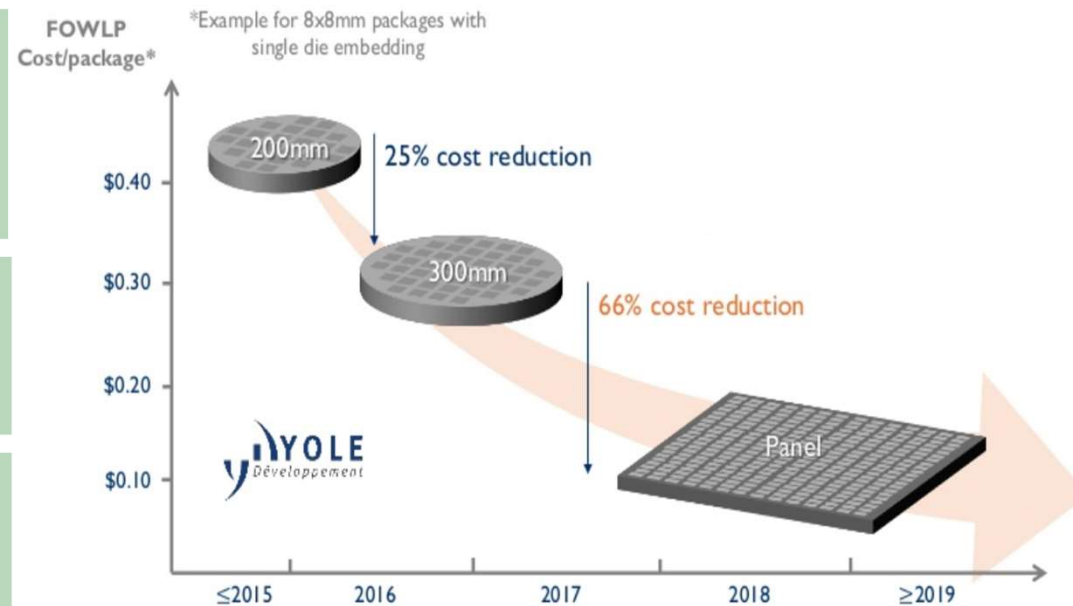
- Thermal dissipation path
- Process tolerance
- Electrical performance

### Size

- Foot print area
- Package thickness

### Cost

- Cost reduction vs traditional FC process
- PLP – even greater reduction than WLP



Sharma, Gaurav, et al. "Advanced FOWLP for small form factor and high-performance microcontroller apps." *Chip Scale Review* Mar. Apr 2020: 17-21. Print.

Image: Equipment and Materials for Fan-Out Packaging 2019 report by Yole [slideshare.net/Yole\\_Developpement/equipment-and-materials-for-fanout-packaging-2019-report-by-yole-dveloppement](https://www.slideshare.net/Yole_Developpement/equipment-and-materials-for-fanout-packaging-2019-report-by-yole-dveloppement)



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**Processing conditions**

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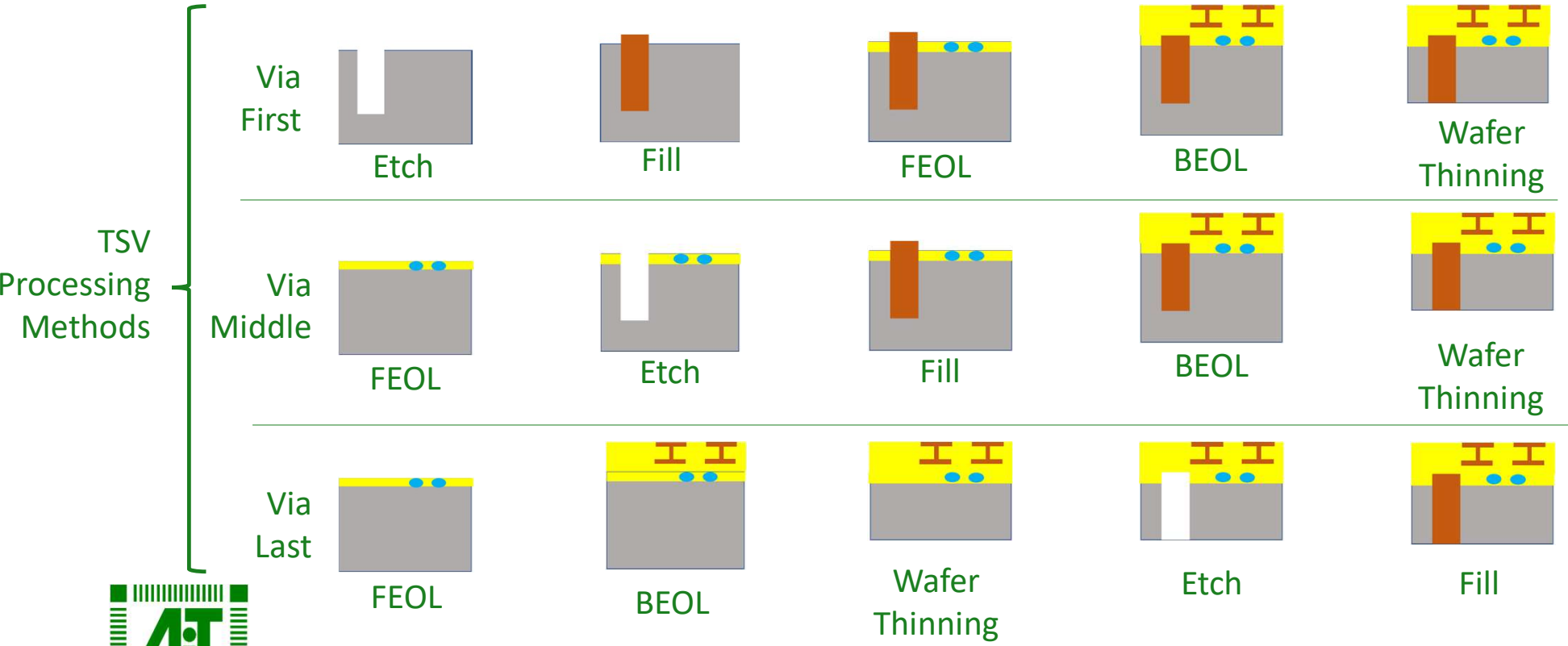
WPA-PRCL-200

GD-BGF 7160 & GD-BGF 7090

GD-WPA-PRCL-300

# Wafer Processing

## Processing Example: 3D Packaging and TSV Creation



# Wafer Processing

## Processing Example: TSV Creation



### Etch

- High anisotropy etch require
  - Bosch process common
- Lithography, passivation, DRIE

### Barrier/Seed PVD

- Sputtering
  - High temp, vacuum possible

### CMP

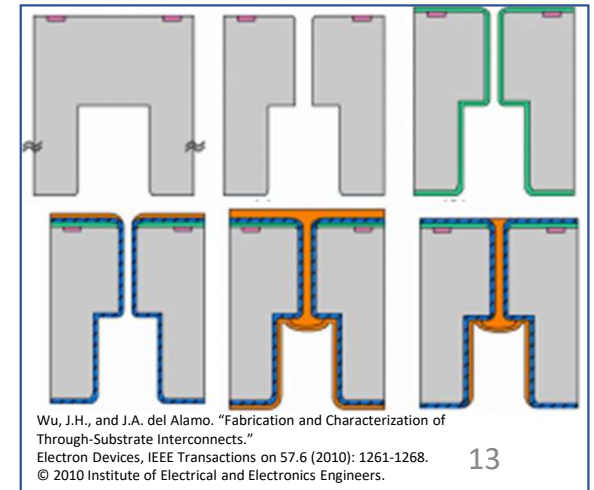
- Mechanical force from abrasives
- Slurry chemistries

### Oxide Deposition

- Prepare via for metal deposition
- CVD process
  - Up to 300°C
  - High vacuum possible

### Cu Plating

- Electroplating process
  - Sulfuric Acid



# Wafer Processing

## Processing Example: RDL

- Some Typical Steps Seen in Processing

Substrate

### Oxide Deposition

- SiO<sub>2</sub> by PECVD

### Resist + Lithography

### Etch

- Dry etch - RIE

### Remove Resist

- O<sub>2</sub> ashing or wet etch

### Similar Processes for RDL Buildup

### CMP

- Mechanical force
- Slurry chemistries

### Cu Plating

- Electroplating process
  - Acid

### Cu Seed

- PVD (sputtering) or CVD
  - High temp, vacuum possible



# Wafer Processing

## Tough Requirements For Temporary Bonding

### Compatible with standard wafer processing

- PVD, CVD, Lithography, Etching, ECD, CMP, Etc.

### Stable under severe conditions

### No outgassing

### Low Stress Bonding and De-Bonding

- Prevent damage to thinned wafer

### De-Bonding and cleaning residuals

- Determine productivity and yield

### Conformable to bumped wafers

- Absorb-encapsulate bumps up to 400 $\mu$ m

Application	Type of Topography	Adhesive Thickness	Today's thin Si TTV Requirements
3D	Pad / RDL (<10 $\mu$ m)	20 $\mu$ m	$\leq$ 2 $\mu$ m
3D / 2.5D	Micro bump (10 - 40 $\mu$ m)	20 - 70 $\mu$ m	$\leq$ 4 $\mu$ m
2.5D	C4 bump (70 - 80 $\mu$ m)	$\geq$ 100 $\mu$ m	$\leq$ 5 $\mu$ m

*Room Temperature Temporary Bonding/Debonding Processes for 2.5/ 3D integration.  
Tim McCrone Applications.Engineer SUSS MicroTec Inc. 430 Indio Way Sunnyvale, CA*



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## Wafer Backgrinding + Wafer Processing

Introduction to AIT Temporary Bonding Solutions

**Motivations  
for  
Innovation**

Background + Technology

Processing conditions

**Temporary Adhesive: Bonding and Debonding**

How AIT can multiply throughput

WPA-LD-350 Product Line

WPA-PRCL-350 & WPA-UVR-270

GD-PRCL-350 Product Line

**Novel Solutions  
from  
AIT Technology,  
Inc**



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**Novel Solutions  
from AIT Technology, Inc**

BGF7160 and BGF7090

WPA-PRCL-200

GD-BGF 7160 & GD-BGF 7090

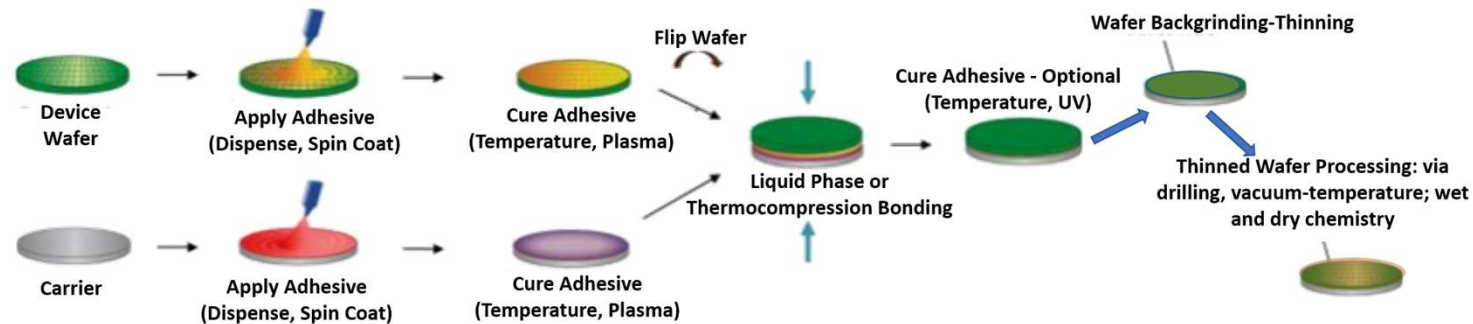
GD-WPA-PRCL-300



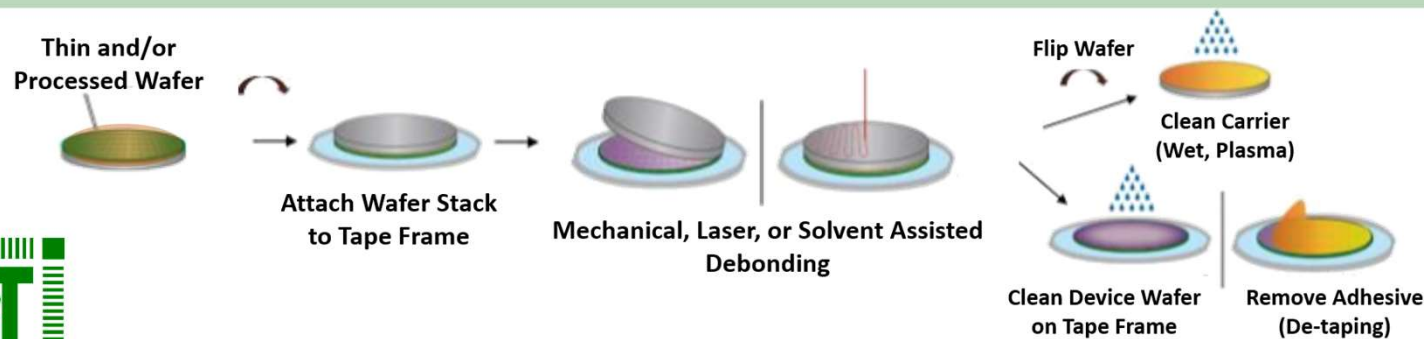
# Wafer Processing

## Bonding and De-Bonding: From Backgrinding to Wafer Processing

### Temporary Bonding



### De-Bonding: Mechanical or Laser Assisted at Room Temperature



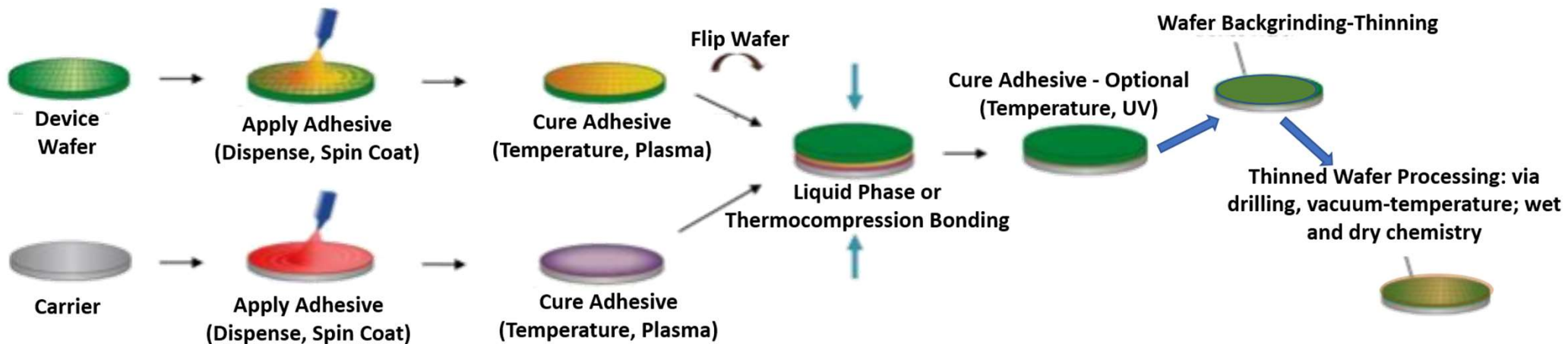
Modified Infographic Original Credit:  
 Room Temperature Temporary Bonding/ Debonding  
 Processes for 2.5/ 3D integration.  
 Tim McCrone Applications Engineer  
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# Wafer Processing

## Traditional Bonding

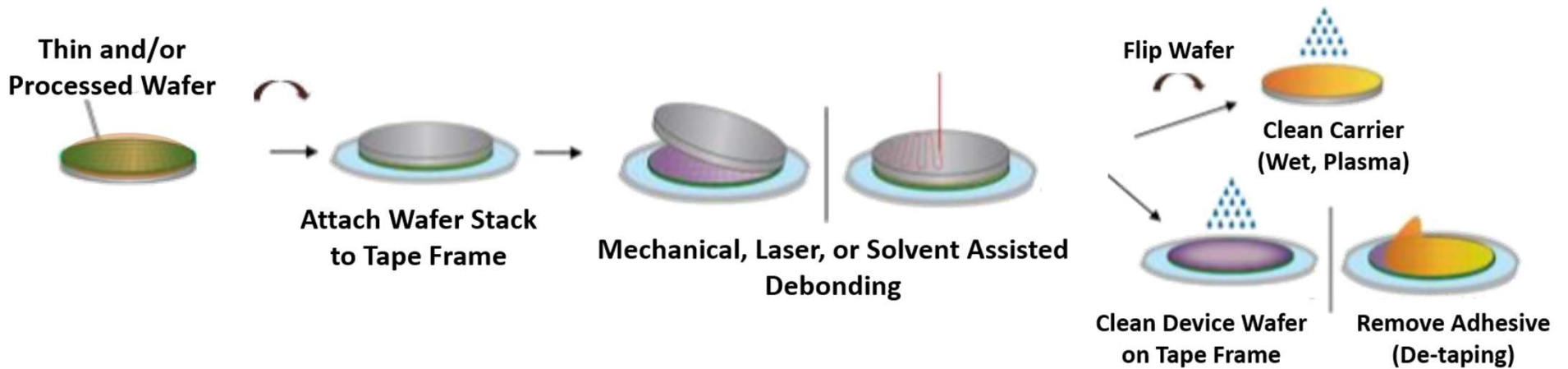
### Traditional Temporary Bonding Adhesive Bonding Process



# Wafer Processing

## Traditional De-Bonding

### Traditional Temporary Bonding Adhesive De-Bonding Process



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GD-WPA-PRCL-300

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# Wafer Processing

## AIT Laser De-Bonding Materials

### **AIT Multilayer Peel and Laser Debonding**

- Film format
- Conformable for topographic encapsulation
- 1 layer laser debonding material
  - Sandwiched by thin peel-release layers
- High Tg
- High Modulus

### **Traditional Laser De-Bonding from AIT**

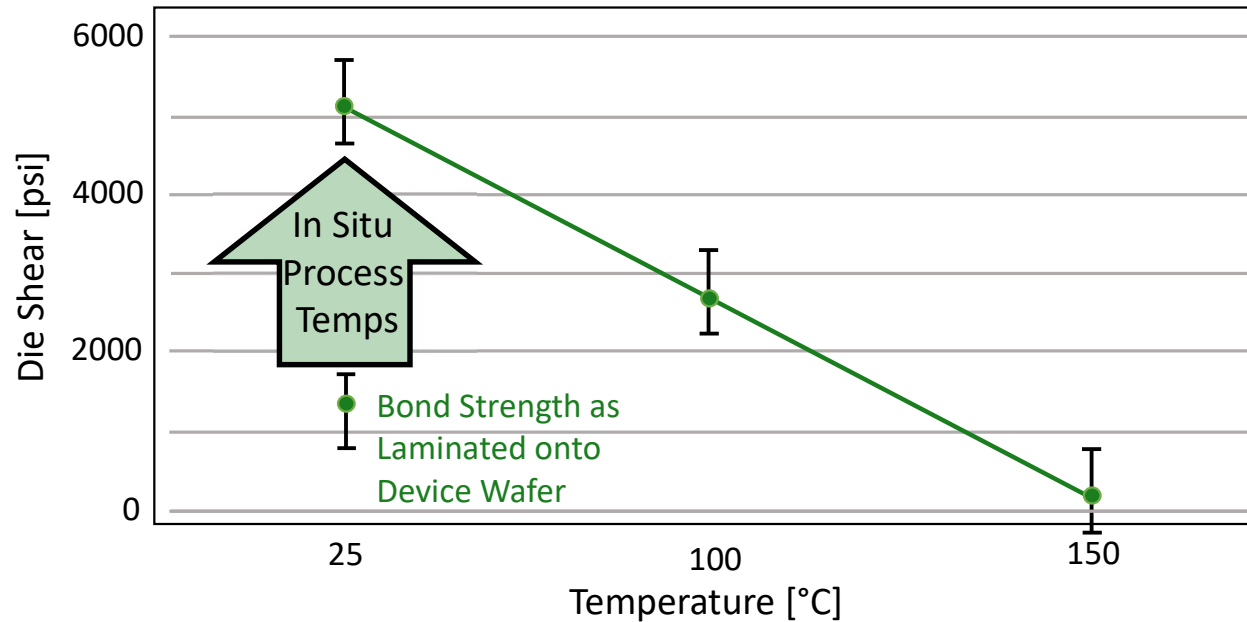
- Film or liquid dispensing
- High Tg
- High modulus
- Focused laser de-bonding
- Conformable for topographic encapsulation



# Wafer Processing

## AIT Laser De-Bonding Materials

WPA-LD-350: Die-Shear Bond Strength on Device Wafer



# Wafer Processing

## WPA-LD-350 and WPA-LD-350-L: Laser De-Bonding

Properties		
Temporary Bonding Adhesive	WPA-LD-350	WPA-LD-350-L
Conformable Adhesive Thickness (µm, for Bumps Absorption)	20, 100, 200, 400	Liquid Form (As Dispensed)
Adhesive Stretchability (Strain Before Breaking)	>30%	>30%
Adhesive Tg (°C)	240	240
Release Liners (Top/Bottom)	50µm/50µm	50µm/50µm
Supported Carrier	Glass	Glass
Melt-Bonding Temperature/Pressure	140-160°C / 10-15 psi	140-160°C / 10-15 psi
Shear Bond Strength at 25°C to 125°C	2,000psi-1,000 psi	2,000psi-1,000 psi

Adhesive Stability		
Temporary Bonding Adhesive	WPA-LD-350	WPA-LD-350-L
Stability at 250°C (Oxygen-free Condition)	No limitation	No limitation
Stability at 275°C (Oxygen-free Condition)	No limitation	No limitation
Stability at 350°C (Oxygen-free Condition)	>60 min.	>60 min.
Vacuum Outgassing Stability	Non-outgassing	Non-outgassing
Solvent and Chemical Stability	Not affected by acid/base and polar solvents	Not affected by acid/base and polar solvents
Water-Jet and Plating Bath Bond Stability	Not affected by plating solution and water	Not affected by plating solution and water

Debonding and Cleaning		
Temporary Bonding Adhesive	WPA-LD-350	WPA-LD-350-L
De-bonding Carrier and Device Wafer	Focused Laser	Focused Laser
Cleaning Solvent-Process for Wafer	Specified Solvent	Specified Solvent
Cleaning Solvent-Process for Carrier	Specified Solvent	Specified Solvent



# Wafer Processing

## WPA-LD-PR-350: Multilayer Peel and Laser De-Bonding

Properties		Adhesive Stability		Debonding and Cleaning	
Temporary Bonding Adhesive	WPA-LD-PR-350	Temporary Bonding Adhesive	WPA-LD-PR-350	Temporary Bonding Adhesive	WPA-LD-PR-350
Conformable Adhesive Thickness (µm, for Bumps Absorption)	100, 200, 400	Stability at 250°C (Oxygen-free Condition)	No limitation	De-bonding Process: from Device Wafer	Focused Laser and Peel-Release
Adhesive Stretchability (Strain Before Breaking)	>30%	Stability at 275°C (Oxygen-free Condition)	No limitation	Cleaning Solvent-Process for Wafer	No Cleaning Required
Adhesive Tg (°C)	240 -55 (Peel-Release Layers)	Stability at 350°C (Oxygen-free Condition)	>10 min.	Cleaning Solvent-Process for Carrier	No Cleaning Required
Release Liners (Top/Bottom)	50µm/50µm	Vacuum Outgassing Stability	Non-outgassing		
Supported Carrier	Glass	Solvent and Chemical Stability	Not affected by acid/base and polar solvents		
Melt-Bonding Temperature/Pressure	140-160°C/10-15 psi	Water-Jet and Plating Bath Bond Stability	Not affected by plating solution and water		
Shear Bond Strength at 25°C to 125°C	2,000psi-1,000 psi				





# Presentation Roadmap

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WPA-LD-350 Product Line

WPA-PRCL-350 & WPA-UVR-270

GD-PRCL-350 Product Line

**Novel Solutions from AI Technology, Inc**



## Wafer Backgrinding and Thinning Special Solutions for Special Material

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**Novel Solutions from AI Technology, Inc**

BGF7160 and BGF7090

WPA-PRCL-200

GD-BGF 7160 & GD-BGF 7090

GD-WPA-PRCL-300

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# Wafer Processing

## Standard Procedures

### Bonding, De-Bonding, and Typical Process Steps

- Spin coat or dispense on carrier
- Dry solvent
- Laminate to active side of wafer
- Backgrind with “water” cleaning
- Stress relief
- Via creation
- Lithography, plating, deposition, etc
- De-bond – separate carrier and device wafer
  - Focused laser, heat slide, solvent assist
- Clean device wafer
- Clean carrier

Additional  
processing  
time,  
resources,  
and  
complicated  
procedures

Lower  
throughput



# Wafer Processing

*Higher Throughput with glass or wafer carrier*

## AIT Temporary Bonding Adhesive Films

Peel-Release Clean: WPA-PRCL-350 | UV-Release Clean: WPA-UVR-270

### Bonding, De-Bonding, and Process Steps

#### With **Novel Solutions by AIT**

- ~~Spin coat or dispense on carrier~~
- ~~Dry solvent~~
- Laminate to active side of wafer
- Backgrind with “water” cleaning
- Stress relief
- Via creation
- Lithography, plating, deposition, etc
- De-bond – separate carrier and device wafer
  - UV or Peel Release
  - ~~Focused laser, heat slide, solvent assist~~
- ~~Clean device wafer~~
- ~~Clean carrier~~

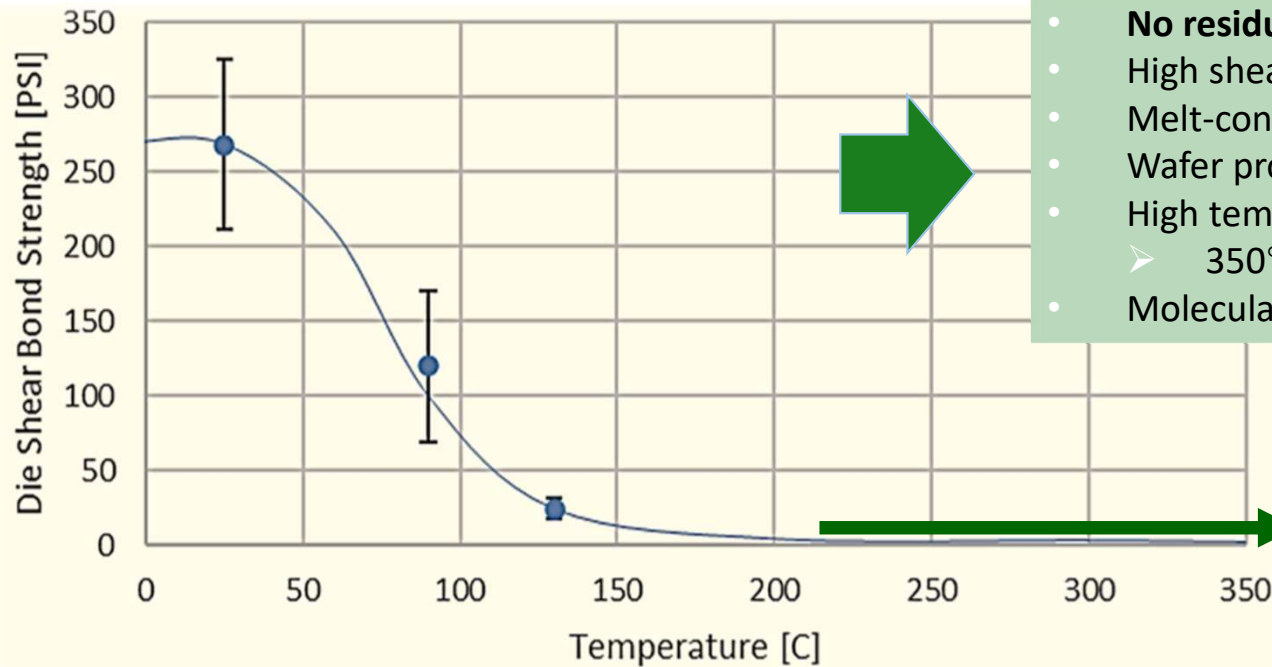
**NO spin coating. NO drying.  
NO expensive, intensive, time consuming debonding  
NO cleaning**

**Higher  
throughput**



# Wafer Processing

## WPA-PRCL-350 and WPA-UVR-270



- **No residuals** - Peel Release or UV release
- High shear bond strength
- Melt-conformable for topographic features
- Wafer processing compatible
- High temperature stable:
  - 350°C and 270°C
- Molecularly engineered flexibility: stress-free

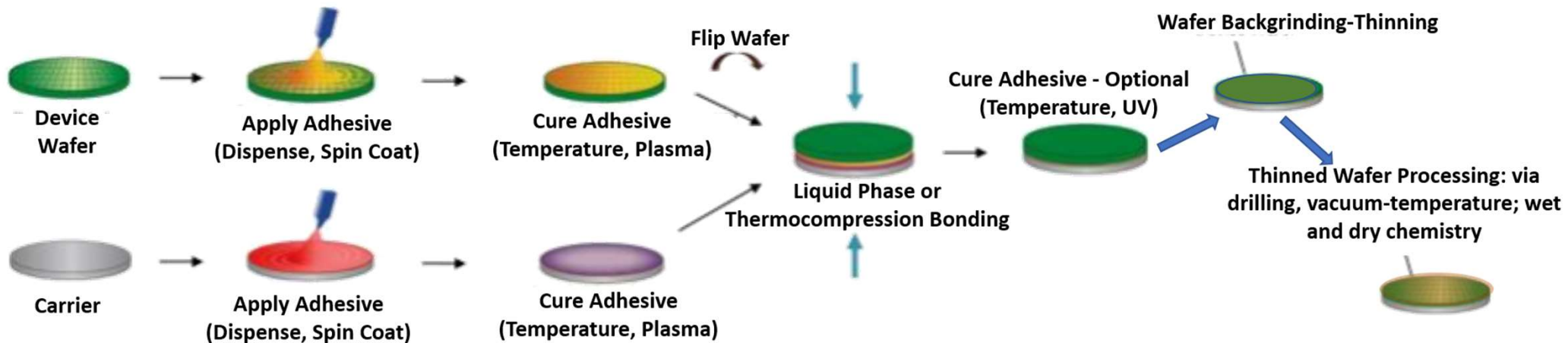
**Flexible Temporary Bonding Adhesive**  
Tested for use at  
**350°C and 270°C respectively for >10 minutes:**  
**No outgassing or degradation**



# Wafer Processing

## Traditional Bonding

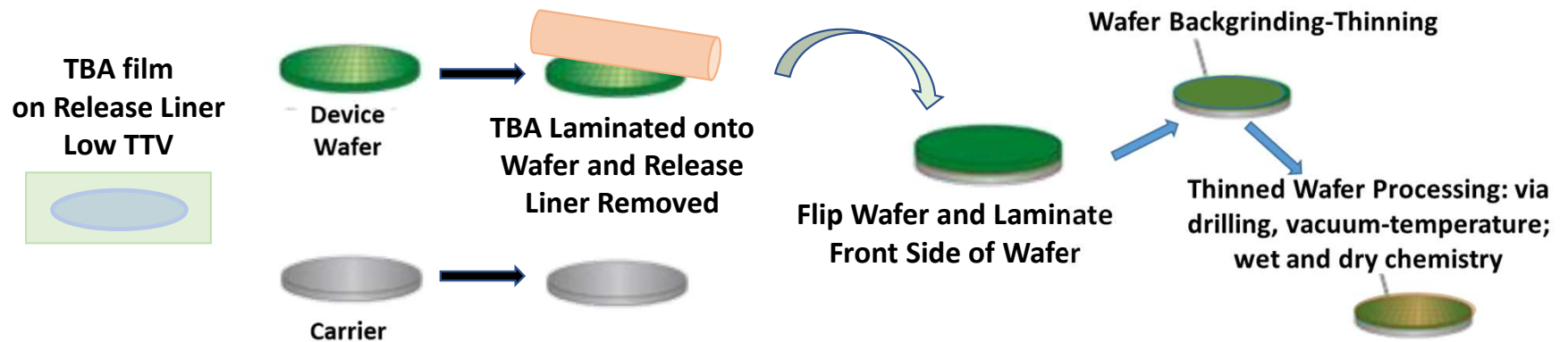
### Traditional Temporary Bonding Adhesive Bonding Process



# Wafer Processing

WPA-PRCL-350 and WPA-UVR-270: Bonding

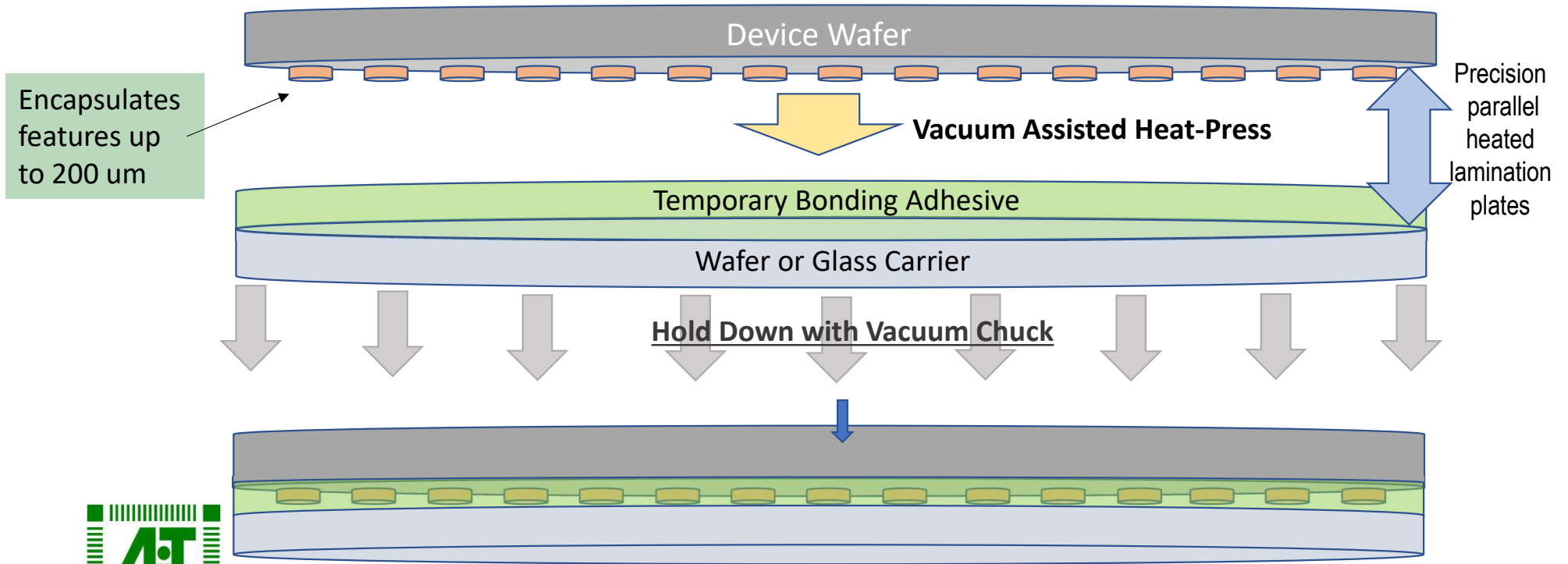
## AIT Temporary Bonding Adhesive Film Bonding Process



# Wafer Processing

WPA-PRCL-350 and WPA-UVR-270: Lamination

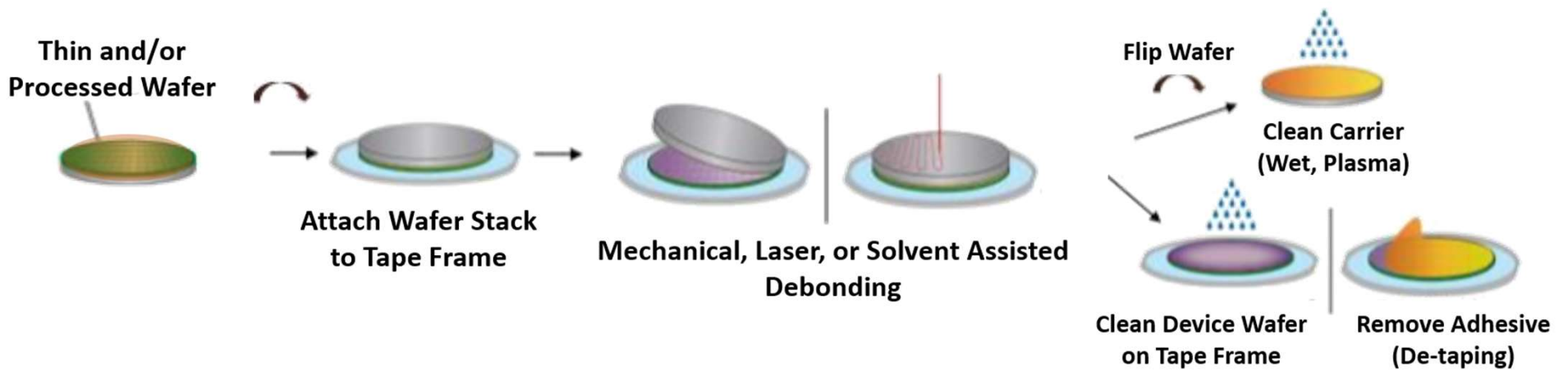
## Lamination Guidelines: Backgrinding and Wafer Processing



# Wafer Processing

## Traditional De-Bonding

### Traditional Temporary Bonding Adhesive De-Bonding Process

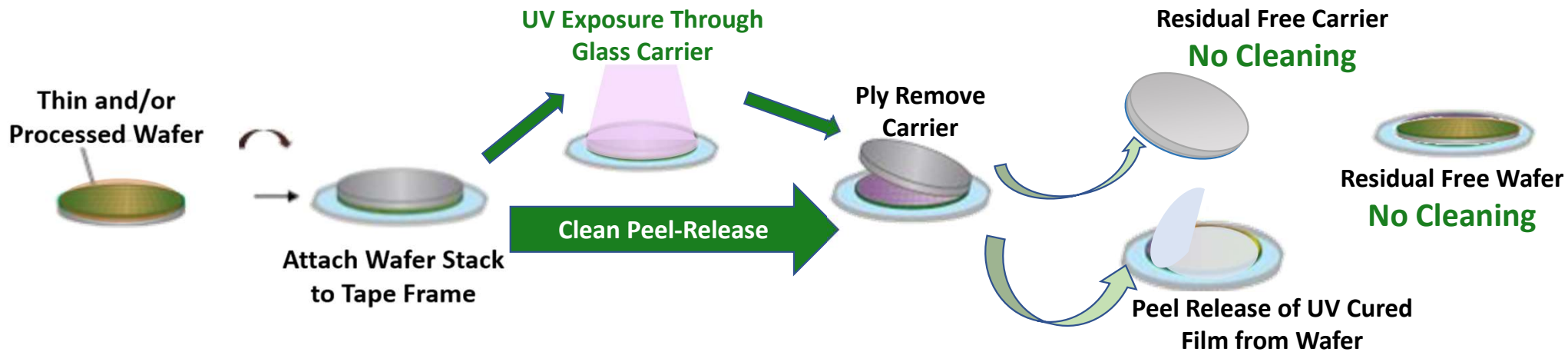




# Wafer Processing

WPA-PRCL-350 and WPA-UVR-270: De-Bonding

## AIT Temporary Bonding Adhesive Film De-Bonding Process



# Wafer Processing

## WPA-PRCL-350 and WPA-UVR-270

Properties		
Temporary Bonding Adhesive	WPA-PRCL-350	WPA-UVR-270
Conformable Adhesive Thickness (µm, for Bumps Absorption)	20, 100, 200, 400	20, 100, 200, 400
Adhesive Stretchability (Strain Before Breaking)	>500%	>500%
Adhesive Tg (°C)	-55	-55
Release Liners (Top/Bottom)	50µm/50µm	50µm/50µm
Supported Carrier	Wafer or Glass	Glass
Melt-Bonding Temperature/Pressure	140-160°C 10-15 psi	140-160°C 10-15 psi
Shear Bond Strength at 25°C to 125°C	350psi-30 psi	350psi-30 psi

Adhesive Stability		
Temporary Bonding Adhesive	WPA-PRCL-350	WPA-UVR-270
Stability at 250°C (Oxygen-free Condition)	No limitation	>60 min.
Stability at 275°C (Oxygen-free Condition)	>600 min.	Not Recommended
Stability at 350°C (Oxygen-free Condition)	>10 min.	Not Recommended
Vacuum Outgassing Stability	Non-outgassing	Non-outgassing
Solvent and Chemical Stability	Not affected by acid/base and polar solvents	Not affected by acid/base and polar solvents
Water-Jet and Plating Bath Bond Stability	Not affected by plating solution and water	Not affected by plating solution and water

Debonding and Cleaning		
Temporary Bonding Adhesive	WPA-PRCL-350	WPA-UVR-270
De-bonding Process: from Carrier	Ply at edge of carrier and peel release	Expose UV followed with ply peel release
De-bonding Process: from Device Wafer	Peel release	Peel release
Cleaning Solvent-Process for Wafer	No cleaning required	No cleaning required
Cleaning Solvent-Process for Carrier	No cleaning required	No cleaning required



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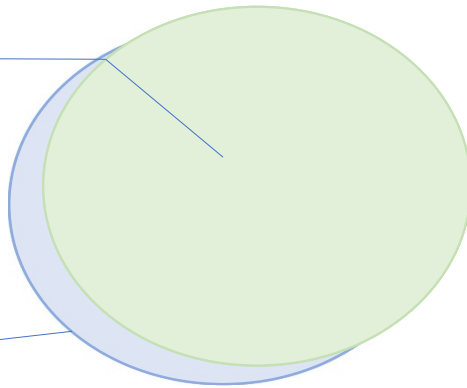
# Wafer Processing

Novel Technology from AIT: Adhesive on Disposable Carriers

**Adhesive comes pre-applied on disposable carrier**

Temporary Bonding Adhesive

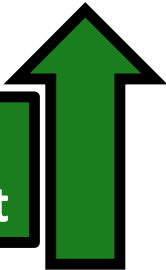
Disposable Carrier



**Clean Peel Release**

**Disposable Carrier**

**Higher Throughput**



**NO Drying**

**NO cleaning**

**NO Solvent**

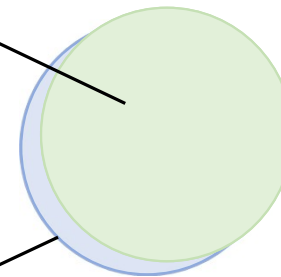
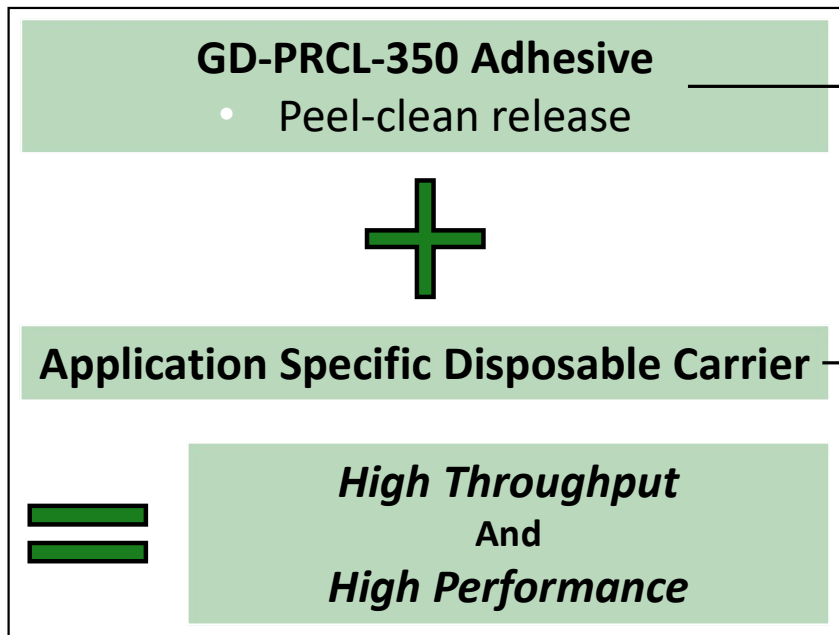
**High uniformity**

**Low TTV**



# Wafer Processing

*Higher Throughput with Disposable Carrier*



Product	Carrier CTE [ppm/°C]
GD-PRCL-350-WS	7
GD-PRCL-350-SS	18
GD-PRCL-350-FG	17



# Wafer Processing

*Higher Throughput with Disposable Carrier*

## AIT Temporary Bonding Adhesive Films Peel-Release Clean GD-PRCL-350

### Bonding, De-Bonding, and Process Steps

- ~~Spin coat or dispense on carrier~~
- ~~Dry solvent~~
- Laminate to active side of wafer
- Backgrind with “water” cleaning
- Stress relief
- Via creation
- Lithography, plating, deposition, etc
- De-bond – Peel release clean
  - Dispose carrier with adhesive
  - ~~Focused laser, heat slide, solvent assist~~
- ~~Clean device wafer~~
- ~~Clean carrier~~

**NO spin coating. NO drying.  
NO expensive, intensive, time consuming debonding  
NO cleaning**

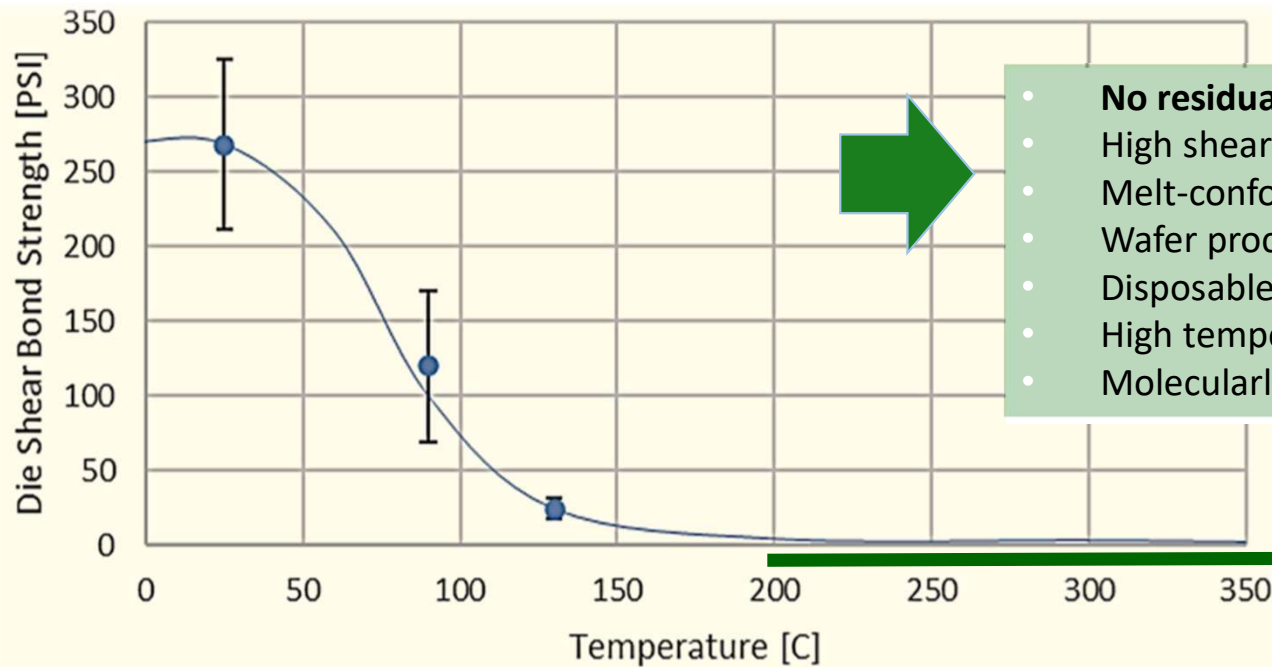
**Bond, process, peel, throw it out.  
On to the next wafer**

**Higher  
throughput**



# Wafer Processing

## GD-PRCL-350 on Disposable Carrier



- **No residuals** - Peel release and dispose
- High shear bond strength
- Melt-conformable for topographic features
- Wafer processing compatible
- Disposable Carrier CTE matched to device
- High temperature stable to 350 °C
- Molecularly engineered flexibility: stress-free

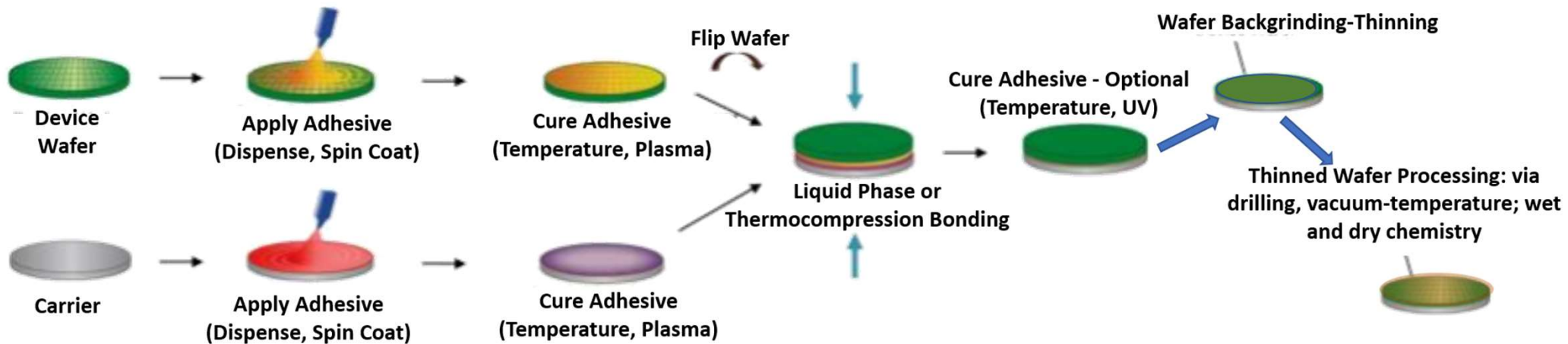
**Tested for use at 350°C  
for >10 minutes  
No outgassing or degradation  
during wafer processing  
conditions**



# Wafer Processing

## Traditional Bonding

### Traditional Temporary Bonding Adhesive Bonding Process

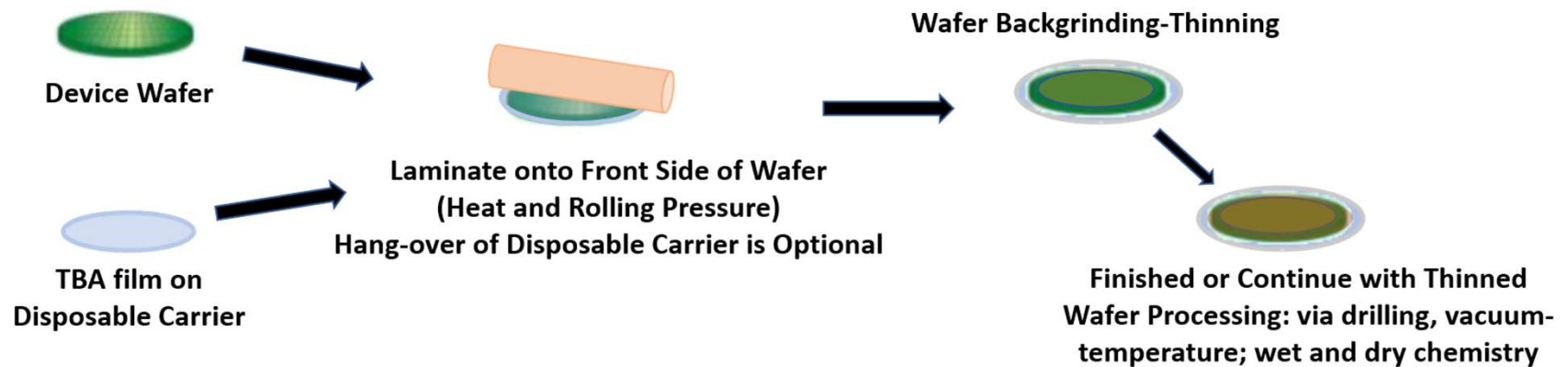




# Wafer Processing

## GD-PRCL-350: Bonding

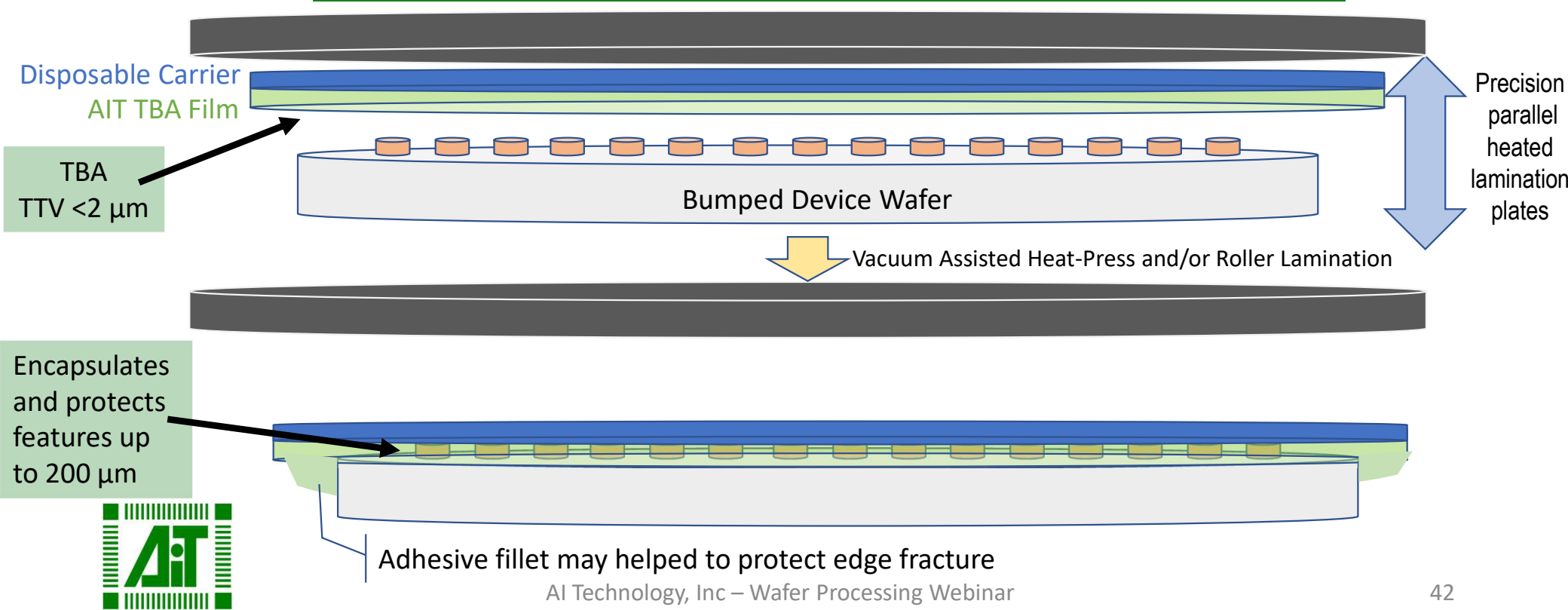
### Bonding AIT Temporary Bonding Adhesive Film on Disposable Carrier



# Wafer Processing

## GD-PRCL-350 on Disposable Carrier: Lamination

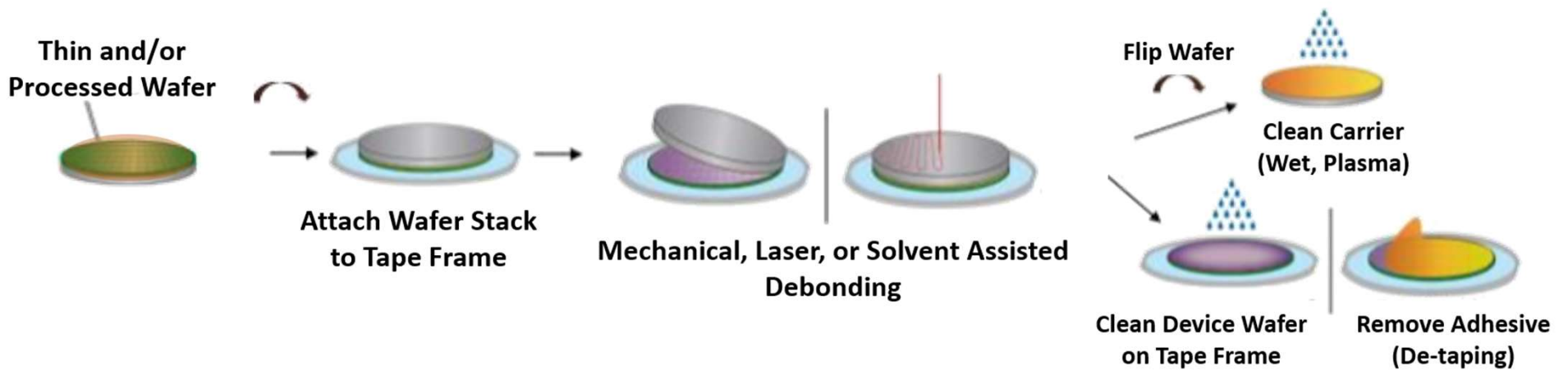
### Lamination Guidelines: Backgrinding and Wafer Processing



# Wafer Processing

## Traditional De-Bonding

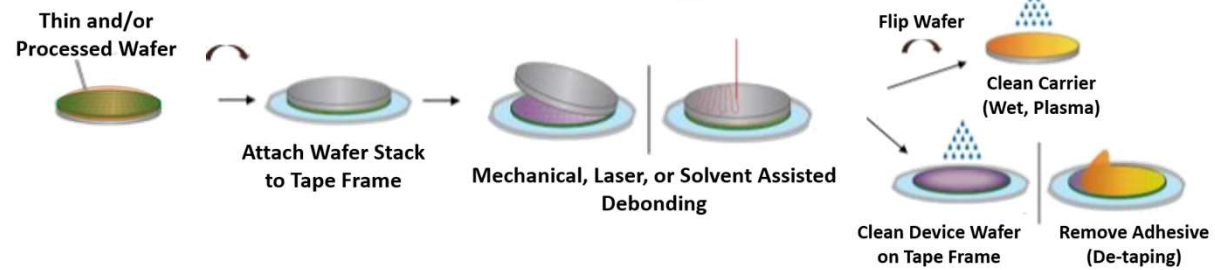
### Traditional Temporary Bonding Adhesive De-Bonding Process



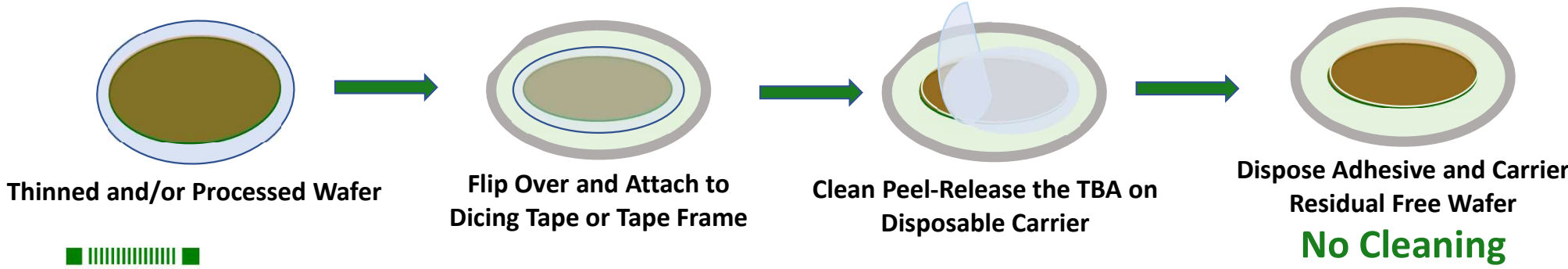
# Wafer Processing

## GD-PRCL-350 on Disposable Carrier: De-Bonding

Traditional Temporary Bonding Adhesive De-Bonding Process



## De-Bonding AIT Temporary Bonding Adhesive Film on Disposable Carrier



# Wafer Processing

## GD-PRCL-350 on Disposable Carrier

Properties	
Temporary Bonding Adhesive	GD-PRCL-350
Conformable Adhesive Thickness (µm, for Bumps Absorption)	20, 100, 200, 400
Adhesive Stretchability (Strain Before Breaking)	>500%
Adhesive Tg (°C)	-55
Melt-Bonding Temperature/Pressure	140-160°C 10-15 psi
Shear Bond Strength at 25°C to 125°C	350 psi-30 psi

Adhesive Stability	
Temporary Bonding Adhesive	GD-PRCL-350
Stability at 250°C (Oxygen-free Condition)	No limitation
Stability at 275°C (Oxygen-free Condition)	>600 min.
Stability at 350°C (Oxygen-free Condition)	>10 min.
Vacuum Outgassing Stability	Non-outgassing
Solvent and Chemical Stability	Not affected by acid/base and polar solvents
Water-Jet and Plating Bath Bond Stability	Not affected by plating solution and water

Debonding and Cleaning	
Temporary Bonding Adhesive	GD-PRCL-350
De-bonding Process: from Device Wafer	Ambient peel release (0% residual)
Cleaning Solvent-Process for Wafer	No cleaning required
Cleaning Solvent-Process for Carrier	No cleaning required

Carrier Properties			
Temporary Bonding Adhesive	GD-PRCL-350-WS	GD-PRCL-350-SS	GD-PRCL-350-FG
Disposable Flexible Carrier Thickness	50µm	50µm	50µm
Carrier CTE (ppm/°C)	7	18	17



# Presentation Roadmap

## Wafer Backgrinding + Wafer Processing

Introduction to AIT Temporary Bonding Solutions

Motivations for Innovation

Background + Technology

Processing conditions

Temporary Adhesive: Bonding and Debonding

How AIT can multiply throughput

WPA-LD-350 Product Line

WPA-PRCL-350 & WPA-UVR-270

GD-PRCL-350 Product Line

Novel Solutions from AI Technology, Inc



## Wafer Backgrinding and Thinning Special Solutions for Special Material

Background

Requirements

Novel Solutions from AI Technology, Inc

BGF7160 and BGF7090

WPA-PRCL-200

GD-BGF 7160 & GD-BGF 7090

GD-WPA-PRCL-300

# Wafer Processing

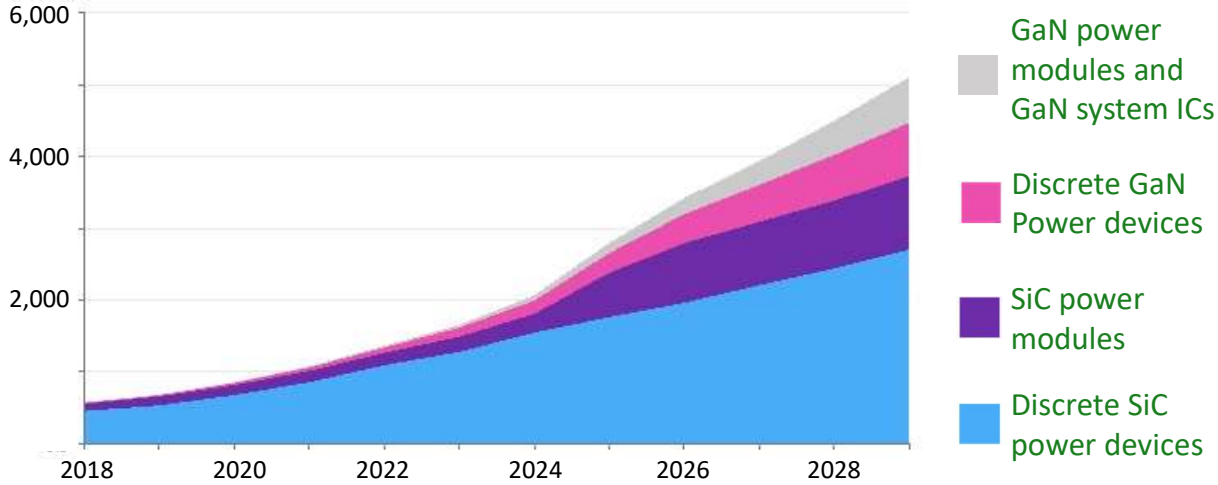
## Technology Background

**Power Semiconductor Devices**

**Optoelectronics**

- Some examples:**
- SiC
  - GaN & other III-V semiconductors
  - Sapphire

SiC and GaN power semiconductors (millions of dollars)



Source: Omdia  
SiC & GaN Power Semiconductors Report - 2020  
Silicon Carbide & Gallium Nitride Power Semiconductors



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for  
Innovation**

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GD-PRCL-350 Product Line

**Novel Solutions  
from  
AI Technology,  
Inc**



## Wafer Backgrinding and Thinning Special Solutions for Special Material

Background

**Requirements**

**Novel Solutions  
from AI Technology, Inc**

BGF7160 and BGF7090

WPA-PRCL-200

GD-BGF 7160 & GD-BGF 7090

GD-WPA-PRCL-300



# Backgrinding

## Temporary Bonding

### Higher Requirements: Where Traditional Backgrinding Adhesives Fall Short

#### Silicon and Traditional Requirements

- Si wafers – relatively soft
- Standard backgrinding tape adequate
  - ~ 200 gm/inch
- No high temperatures
  - Polyolefin or PVC carriers: <70°C
- Some may accommodate bumps

#### Beyond Silicon: Hard and Brittle Materials

- SiC, Sapphire
- III-V Semiconductors

#### Beyond Silicon: Backgrinding

- Higher shear force
- Greater heat generation
- Potentially brittle, fragile materials



# Backgrinding

## Temporary Bonding: Difficult to Grind Materials

### Considerations and Requirements

#### High and stable shear bond strength

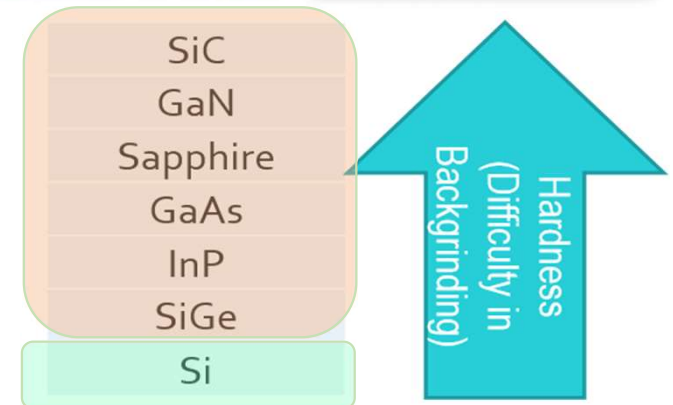
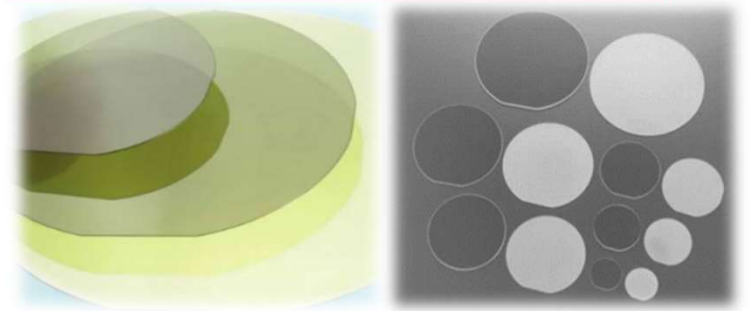
- Hard materials: SiC, Sapphire, etc.
- Fragile materials: GaAs, GaN, etc.

#### Wet and dry etching

- Stress relief

#### Throughput and Yield

- Ease of de-bonding
- Post grind residuals cleaning



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# Backgrinding

## Temporary Bonding: Wax

### Traditional Backgrinding Tape

- Insufficient for difficult to grind materials
- Lack strength
- Low temperature tolerance

### A Different Solution

- Film forming **wax**
- High bond strength
  - Die shear strength >1500 psi
- Maintain strength up to 100 °C

Disco on GaAs and Wax:

***“GaAs is an easily damaged material, so typically wax securing is chosen for grinding due to its strong retaining force.” -Disco***

### Advantages

- Low risk of wafer breakage during grinding

### Disadvantages

- TTV issues: difficulty in application
- Cleaning step after grinding
  - Risk of wafer breakage

**AIT wax solutions eliminate these issues**



# Backgrinding

## Temporary Bonding: Wax by AIT

### Conformable for high topography

- Encapsulate 3 $\mu$ m to 400 $\mu$ m bumps and features

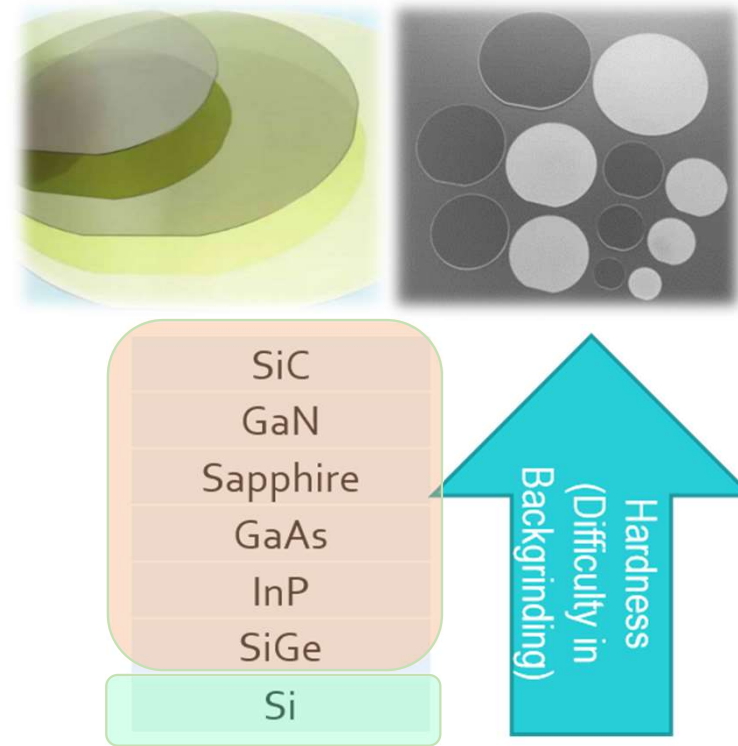
### AIT wax films = Low TTV

- Eliminates operator inconsistency

### High bond strength

### Temperature resistance for hard to grind material

### Cleaning: IPA Wash



# Presentation Roadmap

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Novel Solutions from AI Technology, Inc



## Wafer Backgrinding and Thinning

Special Solutions for Special Material

Background

Requirements

Novel Solutions from AI Technology, Inc

BGF7160 and BGF7090

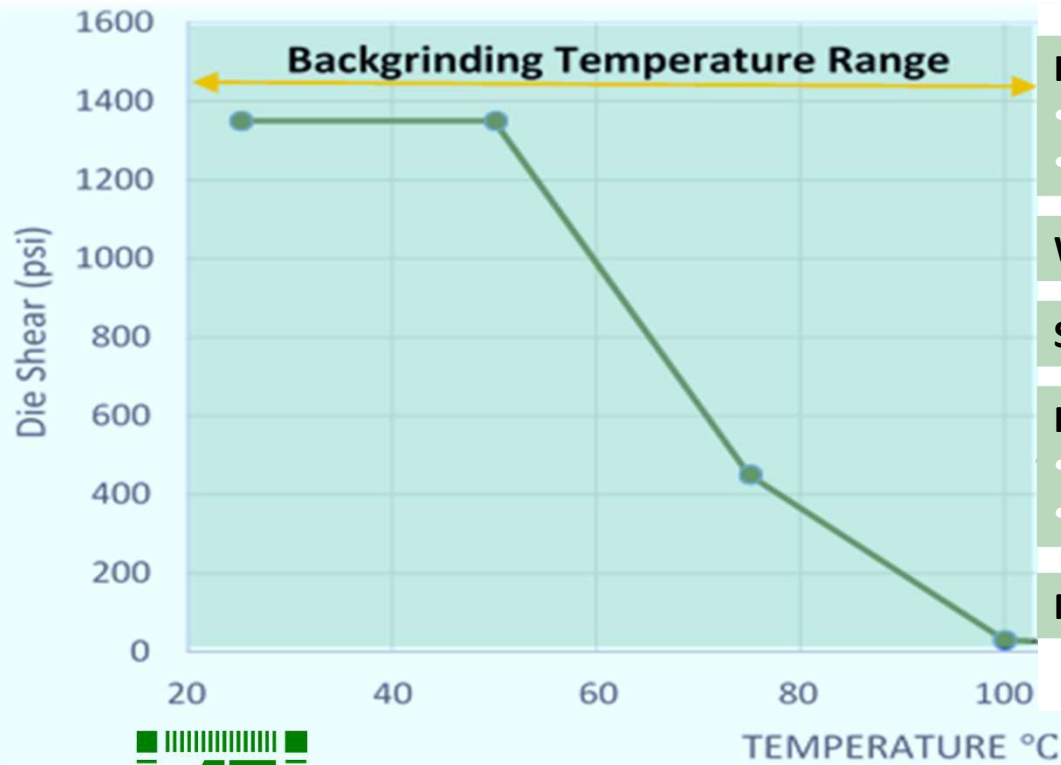
WPA-PRCL-200

GD-BGF 7160 & GD-BGF 7090

GD-WPA-PRCL-300

# Wafer Backgrinding

## BGF 7090 & BGF 7160: High Bond Strength Wax Films



### Heat-sliding de-bonding

- BGF 7160: 180°C
- BGF 7090: 110°C

### Wet and dry etch compatible

### Simple IPA wash

### Film format

- NO spin coating. NO drying.
- High uniformity. Low TTV.

### Molecularly flexible



# Wafer Backgrinding

## WPA-PRCL-200: High Strength Temporary Bonding Adhesive Film

Melt bonding at 140°C to 160°C

Wet and dry etch compatible

Peel release de-bonding

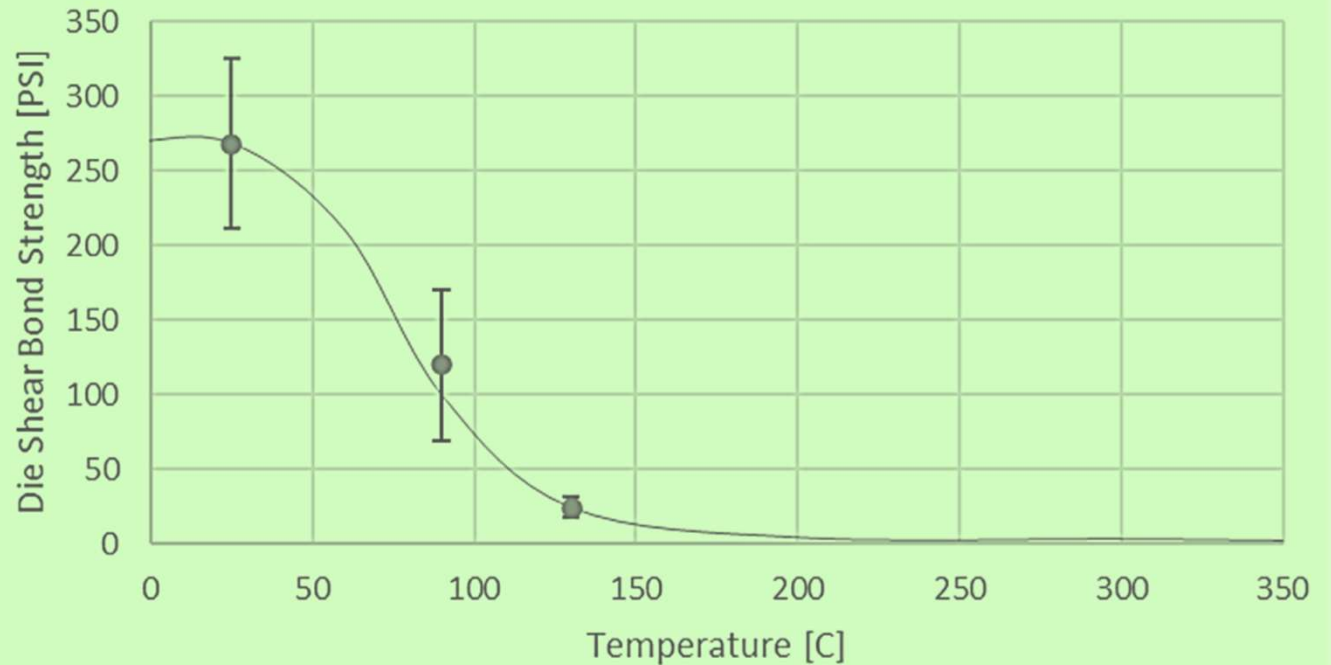
NO residuals. NO cleaning.

### Film format

- NO spin coating. NO drying.
- High uniformity. Low TTV.

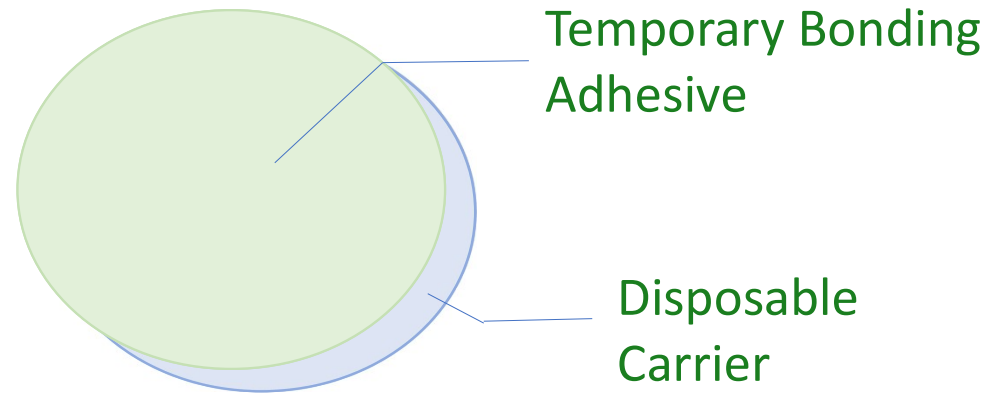
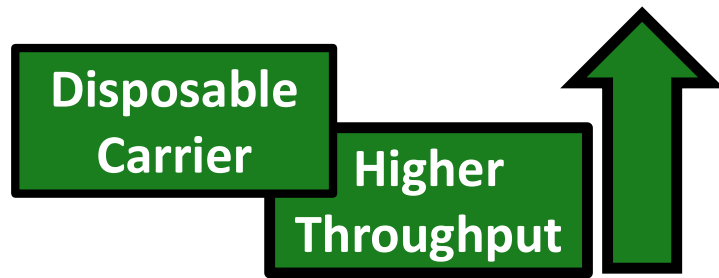
Molecularly flexible

Die Shear vs Temperature



# Wafer Backgrinding

Novel Technology from AIT: Backgrinding Film on Disposable Carriers



NO Drying

NO spin coating

NO carrier cleaning

High uniformity

Low TTV



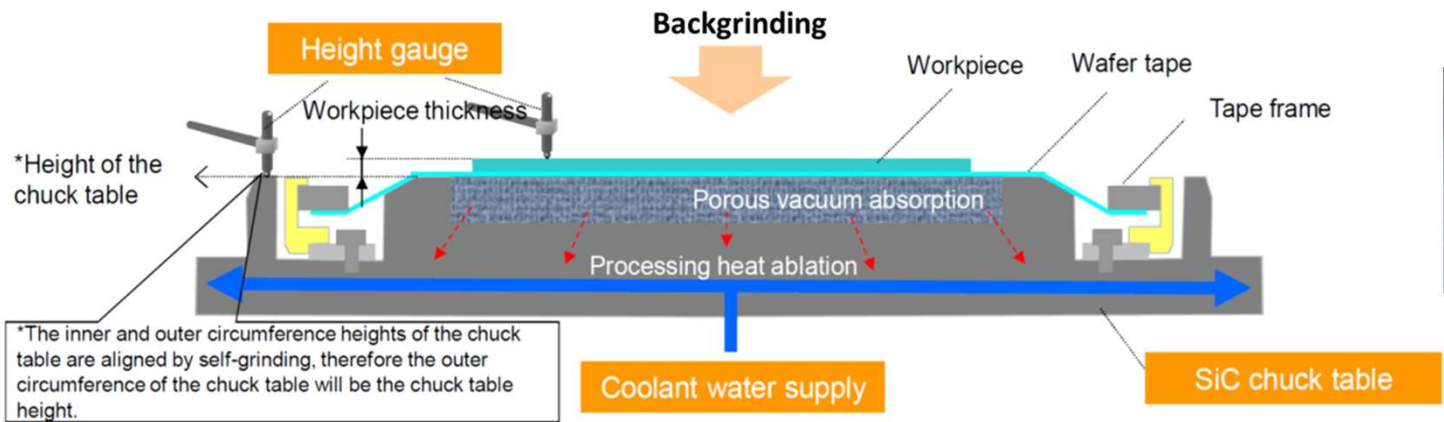


# Wafer Backgrinding

## Backgrinding Film on Disposable Carriers: Equipment

**Disposable Carrier Appropriate Equipment Example:**

### DISCO 'Frame Grinding'



Chuck Table



# Wafer Backgrinding

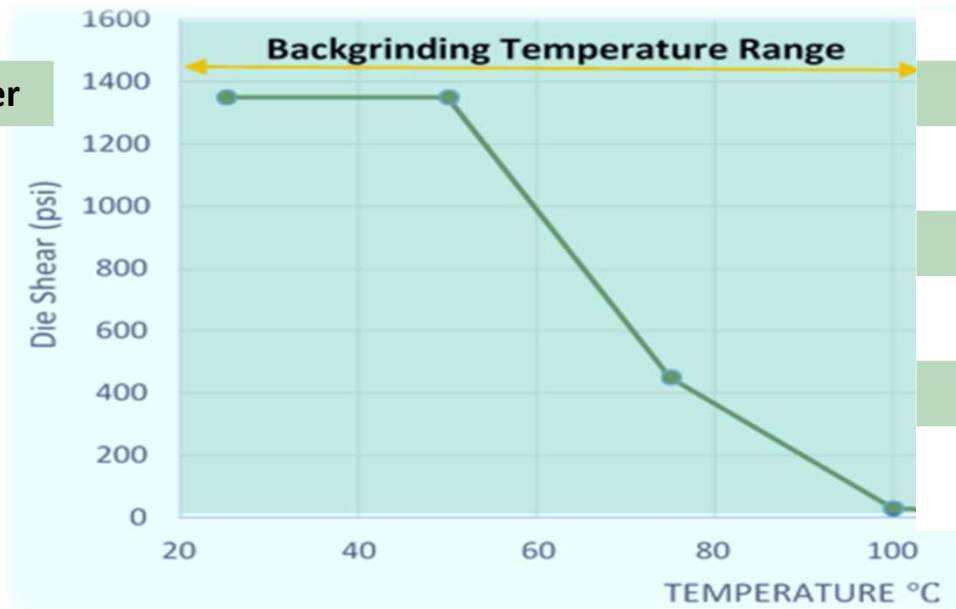
## GD-BGF 7090 & GD-BGF 7160: Wax Films on Disposable Carriers

Film format on disposable carrier

Same high bond strength

Heat-sliding de-bonding

- BGF 7160: 180°C
- BGF 7090: 110°C



Wet and dry etch compatible

Simple IPA wash

Molecularly flexible



# Wafer Backgrinding

## GD-WPA-PRCL-200: Adhesive Film on Disposable Carrier

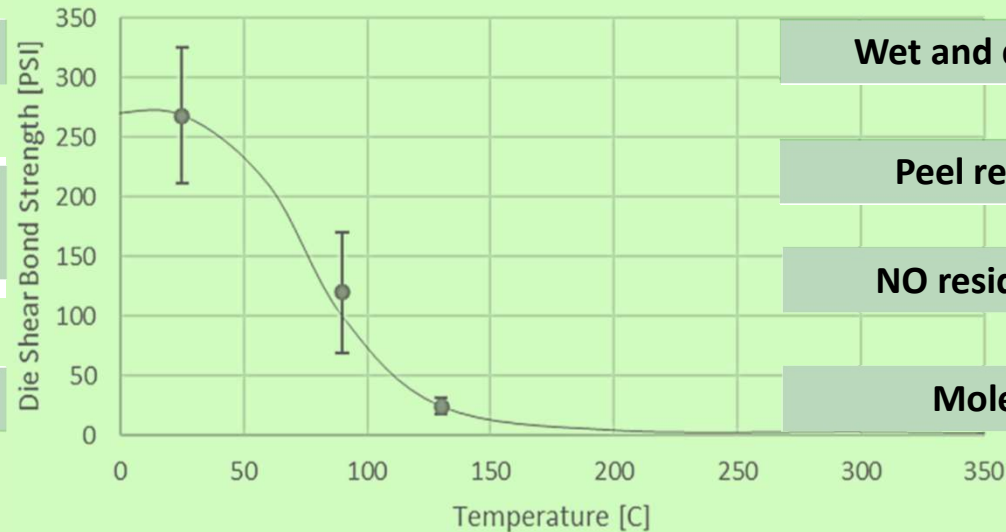
Film on disposable carrier

Roll or press lamination

- Melt bond 140°C to 160°C

High shear bond strength

Die Shear vs Temperature



Wet and dry etch compatible

Peel release de-bonding

NO residuals. NO cleaning.

Molecularly flexible



## AIT Backgrinding-Thinning Temporary Bonding Adhesives

Temporary Bonding Adhesive	BGF 7090	BGF 7120	BGF 7160	WPA-PRCL-200
Liquid Spin-Coating Version	BGL7080	BGL7120	BGL7160	WPA-PRCL-200L
Melt-Bonding Temperature	80-100°C	110-130°C	140-160°C	140-160°C
Shear Bond Strength at 25°C	>1000 psi	>1000 psi	>1000 psi	>300 psi
Shear Bond Strength at 50°C	>1000 psi	>1000 psi	>1000 psi	>300 psi
Shear Bond Strength at 75°C	<30 psi	<30 psi	>200 psi	>150 psi
Shear Bond Strength at 100°C	0 psi	<20 psi	<30 psi	>75 psi
Suggested Zero Shear Removal Temperature	80-100°C	110-130°C	140-160°C	Ambient peel-release only (0% residual)
Cleaning Solvent-Process for Wafer	IPA (Isopropyl Alcohol)	IPA (Isopropyl Alcohol)	IPA (Isopropyl Alcohol)	No cleaning required
Cleaning Solvent-Process for Carrier	IPA (Isopropyl Alcohol)	IPA (Isopropyl Alcohol)	IPA (Isopropyl Alcohol)	No cleaning required



# Thank you!

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**AI Technology, Inc**  
Wafer Processing Adhesives Webinar



# Any Questions?

Visit us on the web: [www.aitechnology.com](http://www.aitechnology.com)

Send us an email: [ait@aitechnology.com](mailto:ait@aitechnology.com)

Give us a call: **1-(609)-799-9388**

To learn more please go to:

[aitechnology.com/products/wafer-processing-adhesives-and-solutions/](http://aitechnology.com/products/wafer-processing-adhesives-and-solutions/)

## AI Technology, Inc

Wafer Processing Adhesives Webinar

