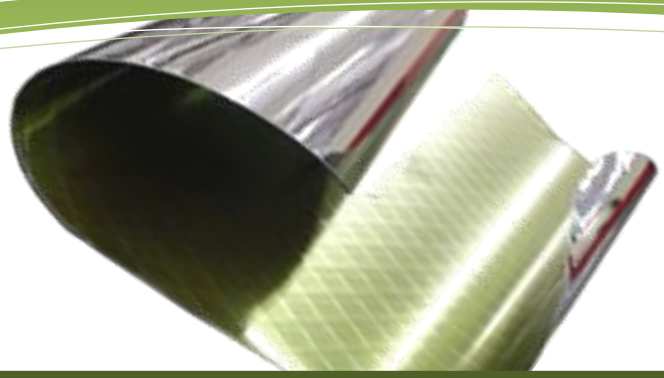
Back-Grinding & Thinning Temporary Bonding Solutions for Wafers & Substrates

- *2-25 Micron IPA Soluble Spin-Coating & Melt-Bonding Film Adhesives*
- *UV & Peel Releasing Tapes for Gold or Solder Bumps Wafer-Substrate*
- *High Temperature &Thermal Conductive Gel & Melt-Bonding Film*



Temporary Adhesive Solutions for Wafer & Substrate Thinning

Proven Solutions and Innovative New Temporary Bonding Adhesives

Thermal Grease-Gel CGR7016 and CGR7018 from AI Technology (AIT) have been proven solutions in the world for ultra-high vacuum and temperature etching operations for thinning wafers and substrates for over 10 years. Similar temporary thermal interface bonding film formats of similar thermal and electrical solutions have been part of material solution kits for some of the most critical operations within the most advanced chambers made in the world.

Vacuum chambers at 10–12 or 100 nPa pressure with optical windows and ultra-clean stainless steel have relied on these materials to avoid contamination from "silicone" greases or gels or pads and downtime.

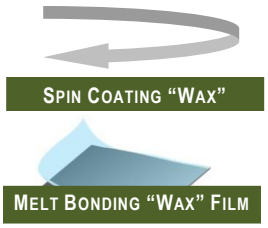
The Microlab at Berkeley and SPTS both use AIT solutions:
http://microlab.berkeley.edu/labmanual/chap1/MOD35.pdf
http://www.spts.com/

AIT is also the only US based manufacturer for the most innovative temporary bonding adhesive solutions in tapes and spin-coating formats for back-grinding and thinning of bumped and features-rich wafers and substrates. High temperature stable UV, heat-releasing and controlled peel releasing tapes are available for single or both surface grinding operations.

What distinguishes AIT Back-grinding Temporary bonding adhesive solutions?

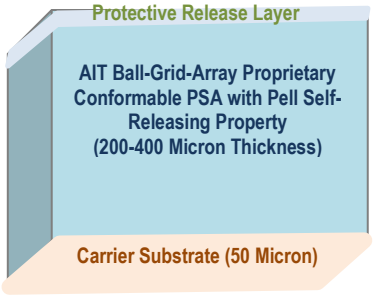
In addition to our proven record of usage achieving unparalleled feats of high vacuum, high temperature and low thermal resistance, AIT temporary bonding adhesive solutions are the most comprehensive material solutions innovated and manufactured in the United States. AIT has some of most advanced materials and experienced chemists in formulating and customizing temporary bonding materials and solutions for critical semi-conductor and microelectronic operations of thinning wafers for superior performance. Key distinguishing features of AIT include:

- Pioneering and proven high temperature controlled peel and UV release tapes for operations at temperatures from 150°C to as high as 250°C for short periods.
- For LED sub-mount thinning, rough and fine wafer grinding with IPA solution temporary adhesive that leaves absolutely no residual during post grinding operations. Bonding and debonding with minimum vacuum or mechanical pressure of less than 10 psi at temperatures of 90-120°C. AIT provides large area film "wax" (IPA solution) with the same performance and ease of cleaning.
- Proven solution in temporary bonding thermal grease-gel including "industry-standard" high vacuum etching, CGR7016 and CGR7018, and melt-bonding electro-thermal film pads including CB8130, CPR8850, etc.
- Ultra-low water absorption and sensitivity.
- RoHS, REACH and WEEE compliant.
- AIT's team of engineers, chemists and material scientists stand ready to help select and customize a temporary bonding solution for your specific processing parameters.



IPA Soluble Spin-Coating and Preformed Film for Instant Melt-Bonding and Melt-Debonding

High Elevated Temperature Conformability to Flip-Chip Bumps of 50 Micron or Higher with Outstanding Total Thickness Variation (TTV) Upon Lamination (0% Residual Upon Release after up to 150°C exposure)



High Ambient Conformability to BGA Bumps of 200 Micron or Higher with Outstanding Total Thickness Variation (TTV) Upon Lamination (0% Residual Upon Release after up to 150°C exposure)

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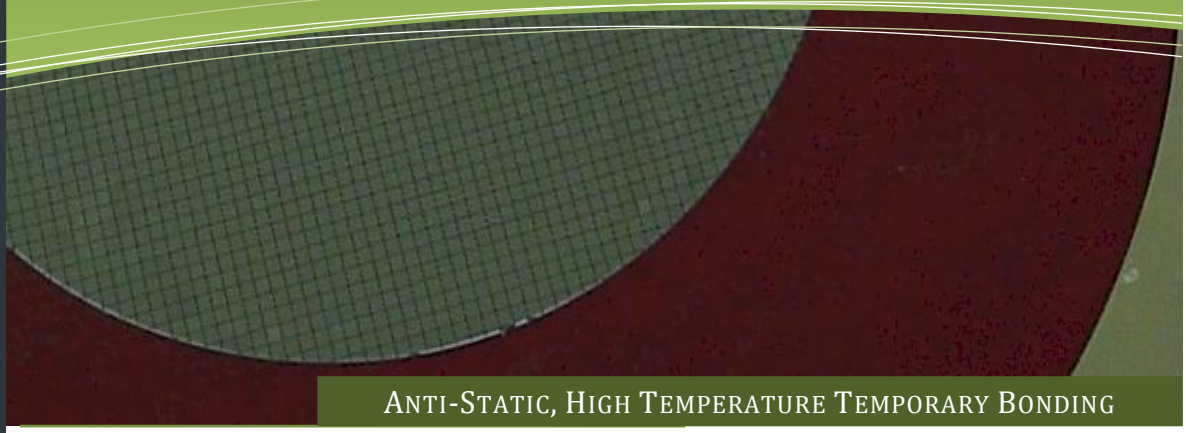
Wafer Processing: Back-Grinding & Thinning Temporary Bonding Tape Solutions

UV, Heat & Peel Releasing Tapes for Bumped Wafer or Substrate
High Temperature & Anti-Static for More Reliable Operations



Anti-Static, High Temperature Temporary Bonding

Non-Silicone, Non-EVA Based Compressible Back-grinding and Thinning Temporary Bonding Tapes for Bumped Wafers and Substrates with up to 250 Micron Bump Heights

The configuration of the temporary bonding tapes are engineered for high reliability for wafers and substrates with extensive bumped features or flat with nominal or no features.

- Protect and encapsulate the gold, solder or copper bumps or columns during the back-grinding and thinning process.
- All component materials in the temporary bonding tapes are engineered with high molecular stability to withstand high temperature exposure up to 150°C and 280°C respectively for PET and Polyimide carrier film.
- Typical temporary bonding and back-grinding operations leave no or minimal residuals on the wafers or substrates and require no cleaning.
- Proven to leave 0% residual even after extended high temperature and /or high pressure operations.
- The bonding and protective adhesive-buffer layer are made to bond strongly onto PET and PI carrier film with outstanding thickness control. AIT design the buffer-adhesive to conform at recommend lamination temperature range of 60-120°C to allow further planarization to less than 5 micron TTV control before back-grinding operation to very thin wafers.

Properties of AIT Wafer Processing, Back-Grinding and Protection Tapes for Bumped Wafers and Re-distributed Panels

PARAMETER	WPA-TS-350; WPA-TS-300; WPA-UVR-250	GD-UVR-20, 100, 400M	GD-PR-20, 100, 400M
Temporary Bonding Adhesive Configuration and Application Process	• Self-supporting film adhesive on release liners • Heat lamination at <150ºC • Glass carrier for WPA-UVR • WPA-TS supports any suitable carriers	• UV Releasing with carrier film • Adhesive on one or both sides • 0% residual	High temperature Capable Controlled Release @100gm/25mm
Carrier Support Film and Adhesive Thickness	• Self-supporting • Choices from 20-400µ	• 100µ carrier film • Adhesive choices from 20-400µ	• 50µ carrier film • Adhesive choices from 20-400µ
Thickness of Compressible-Compliant Layer	• 100-micron for stud, micro-bump wafers • 400-micron for BGA • 20-micron for protection	• 100-micron for stud, micro-bump wafers • 400-micron for BGA • 20-micron for protection	• 100-micron for stud and micro-bump wafers • 400-micron for BGA • 20-micron for protection
Peel Strength in Operation (ppi)	• >300 ppi (300gm/25mm)	• 100 ppi (100gm/25mm)	• 100-300 ppi (100-300gm/25mm)
Release and Cleaning Mechanism	• WPA-TS: Heat Sliding + Solvent Cleaning • WPA-UVR: UV Releasing with 0% residual	• UV Releasing • 0% residual	• Peel Release • 0% residual
Temperature Capability	• 250-350°C	• 250°C	• 280°C
Chemical Resistance	Outstanding	Outstanding	Outstanding
Water Jet Resistance	Outstanding	Outstanding	Outstanding

High Conformability to BGA Bumps of 200 Micron or Higher with <5 Micron Total Thickness Variation (TTV) Upon Lamination (0% Residual Upon Release)

High Elevated Temperature Conformability to Flip-Chip Bumps of 50 Micron or Higher with <5 Micron Total Thickness Variation (TTV) Upon Lamination (0% Residual Upon Release)

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Back-Grinding & Thinning Temporary Bonding "IPA-WAX" and "PEEL-RELEASE" Solutions for Wafers & Substrates

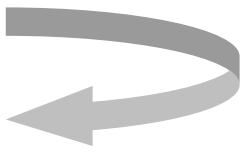
- *Spin Coating IPA Wax Solution for 2-15 Micron Temporary Bonding*
- *IPA Soluble Temporary Bonding Films of 12 & 25 Micron*
- *Industry First: Proven 0% Residual Peel Release, No Clean Solutions*

Spin Coating IPA Wax Solutions

Properties of AIT Back-Grinding & Thinning Media and Tapes

AIT LIQUID AND FILM WAX ADHESIVE FOR BACK-GRINDING, LAPPING AND POLISHING				
PARAMETER	**BGL-7080**	**BGF-7090**	**BGL-7160**	**BGF-7160**
	Film Forming Liquid Wax	**Dry Wax-Film Adhesive**	**Film Forming Liquid Wax**	**Dry Wax-Film Adhesive**
Release Mechanism-Material and Thickness	Melt and Mechanical Slipping Debonding	Melt and Mechanical Slipping Debonding	Melt and Mechanical Slipping Debonding	Melt and Mechanical Slipping Debonding
Bonding Temperature and Mechanism	• >90°C with vacuum assisted compression	• >90°C with vacuum assisted compression	• >160°C with vacuum assisted compression	• >160°C with vacuum assisted compression
Thickness of Temporary Bonding Layer	• 2-15µm by spinning	• 3µm and up	• 2-15µm by spinning	• 3µm and up
Die-Shear Bond Strength (PSI)	• >500 psi	• >500 psi	• >500 psi	• >500 psi
Operational Temperature Capability	• Up to 75°C	• Up to 75°C	• Up to 125°C	• Up to 125°C
De-Bonding Temperature and Mechanism	• >100°C with slipping push	• >100°C with slipping push	• >160°C with slipping push	• >160°C with slipping push
Cleaning Media	Iso-propanol (IPA)	Iso-propanol (IPA)	Iso-propanol (IPA)	Iso-propanol (IPA)
Water Jet Resistance	Outstanding	Outstanding	Outstanding	Outstanding

- **Note #1:** All back-grinding and thinning temporary materials are free of silicones or siloxanes.
- **Note #2:** Anti-static versions are available for all of the UV, heat or peel release temporary bonding.



Spin Coating "Wax"

IPA Soluble Spin-Coated Specialty "Wax" 2-25 Micron Thick, Instant Melt-Bonding for Temporary Bonding and Instant Melt-Debonding for Ease of Removal

Melt Bonding "Wax" Film

Preformed Film of 12.5 and 25 Micron Thick Specialty "Wax" for Instant Melt-Bonding and Melt-Debonding for Ease of Removal

Melt Bonding PSA on PET or PI Carrier

- VVT control heat-lamination at 60-120°C
- Back-Grinding and other Temperature-Chemical Processing
- Peel release with 0% residual for no cleaning

Spin-Coating Temporary Bonding Media

- 50% solid version (BGL7080) for 5-15 micron spin coating
- 25% solid version (BGL7080) for 2-10 micron spin coating
- Ideal for precision thickness wafer and substrate thinning
- IPA soluble and carrying solvent for safe and convenient operation
- Water resistance enables cooling for high pressure fast grinding operation
- Non-silicone and non-contaminating

Pre-Formed Temporary Bonding Film

- 12 and 25 micron thick flexible preformed film that melt-bonds instantly
- Ideal for precision thickness wafer and substrate thinning
- IPA soluble and carrying solvent for safe and convenient operation
- Water resistance enables cooling for high pressure fast grinding operation
- Non-silicone and non-contaminating

Peel Release, No Clean, Pre-Formed Temporary Bonding Film

- Heat lamination at 60-120°C for ultimate VVT control
- Ideal for precision thickness wafer and substrate thinning
- Water resistance enables cooling for high pressure fast grinding operation
- Peel release with 0% residual, requires no cleaning

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Back-Grinding & Thinning Temporary Bonding Thermal Solutions for Wafers & Substrates

High Thermal Grease-Gel Bonding in High Vacuum Etching Chamber
High Thermal Bonding Pad for High Vacuum Etching Chamber

High Thermal Grease-Gel Bonding

High Vacuum Etching Temporary Bonding Thermal Adhesives

PROPERTY/PARAMETER	CGR7016/CGR7018	CGR8150/CGL8150	CB8130/CPR8850
Bond Strength (Operation)	Capillary, 10 psi shear	Capillary, 10 psi shear	>900/>300 psi shear
Removal (Method)	IPA with/without Heat	IPA with/without Heat	150°C/90°C slip
Vacuum Capability	10^{-12} pressure	10^{-12} pressure	10^{-12} pressure
Chemical & Etching Tolerance	Proven, Outstanding	Proven, Outstanding	Proven, Outstanding
Dielectric Strength (Volts/mil)	>250	>300	>750
Device Push-off Strength (psi)	>10	>1000	>1000
Density (gm/cc)	2.5	2.5	2.5
Thermal Conductivity	> 4.0 W/m-°C	> 8.0 W/m-°C	> 12 W/m-°C
Maximum Continuous Operation Temp. (°C)	> 150	> 150	> 150
Electrical Resistivity	$>10^{14}$ ohm-cm	$\sim 10^{-4}$ ohm-cm	$>10^{14}$ ohm-cm

About AI Technology, Inc.

Since pioneering the use of flexible epoxy technology for microelectronic packaging in 1985, AIT has been one of the leading forces in developing advanced materials and adhesive solutions for electronic interconnection and packaging. The UV and/or peel release wafer-substrate back-grinding and thinning temporary bonding materials are examples of these innovations. Besides pioneering the use of "phase-change" materials (PCM) as thermal interface materials (TIM), AIT has provided microelectronic packaging industries with its flexible epoxy thermal adhesives. By managing interfacial stress induced by differential coefficient of thermal expansion between bonding adherents, these thermal management materials have found extensive use and success in critical military and aerospace applications.

The same stress-free dielectric adhesives are now adapted for use in insulated metal substrates with copper and aluminum clad. The key advantage of these thermal management materials is their unparalleled long-term reliability attributed to their ability to withstand repeated thermal cycling and stress-free bonding between the heat-spreader plate and the circuit layer. AIT also offers the same flexible epoxy pre-preg with high thermal conductivity for more advanced multilayer insulated metal substrate circuits and modules. This novel class of thermal management materials provides a platform and infrastructure for large area thermal management of power modules such as solar cells, LED panels, etc.

AIT has a full line of die and substrate attach films and pastes, thermal interface materials, (EMI/RFI) mitigation material solutions, conductive caulks and adhesives and advanced flexible and Insulated Metal Circuit Substrates. The company has an ISO9001:2000 certified manufacturing and R&D facility on a 16-acre campus in Princeton Junction, NJ. Sales support includes company direct offices in Shenzhen-HK China and sales reps in Europe and Asia.

The World's Most Proven Thermal Conductive Media Operating in the Highest Vacuum Chamber

CGR7016 and CGR7018 are used extensively and serve as "industry standard" holding and thermal media for ultra-high vacuum etching and thinning operations.

The Microlab at Berkeley and SPTS both use AIT solutions:
http://microlab.berkeley.edu/labmanual/chap1/MOD35.pdf
http://www.spts.com/

The same thermal, etchant resistant and high vacuum performance features are available in bonding pad formats and have also been used in many specialty substrate thinning operations. Applications have been proven in the world's best known semi-conductor processing chambers.

AIT's materials are uniquely capable of performing under extreme conditions without incurring the costly set back of contamination or down time.