

# Langley Research Center - Soluble Imide (LaRC-SI), Bonding Experiment

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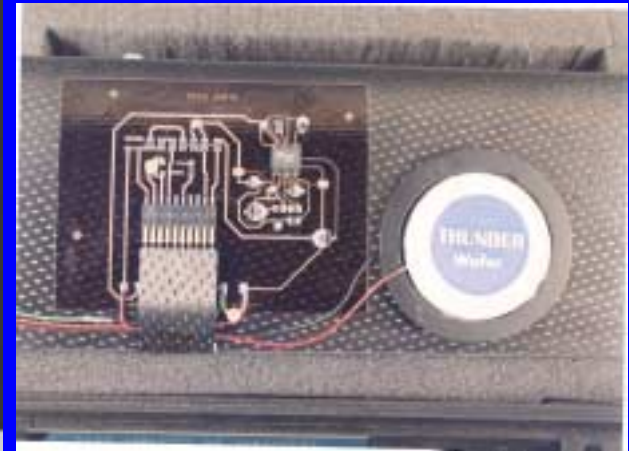
# Background

- Success
- Multi-layer Circuit Vias
- Plasma Etch
- Bonding Multiple Layers
- Bonding Experiment
- Bonding Experiment Results
- Summary



# Success

- GIFTS 5-Layered Circuit (large vias)
- Flex Cable (two layers, no vias)
- Circuit to structure (one layer)

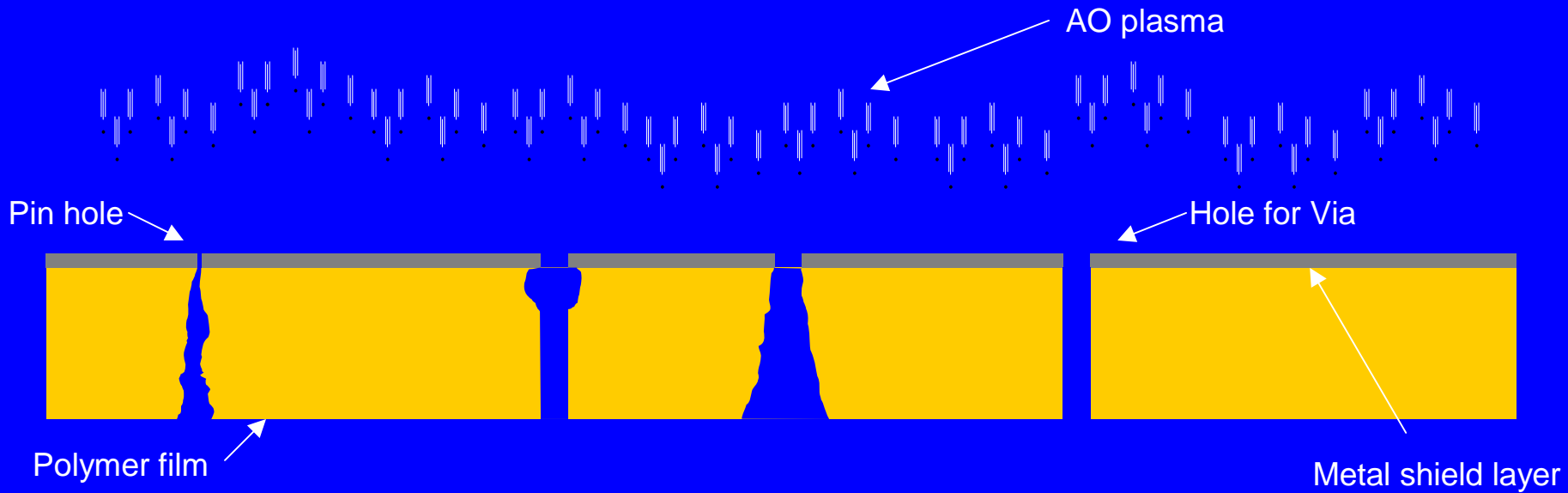


# Multi-layer Circuit Vias

- Drill (labor intensive)
- Punch (labor intensive)
- Laser (expensive)
- Plasma Etch (inexpensive)



# Plasma Etch



# Bonding Multiple Layers

Un-etched via



Etched via



Assembled GAMS  
circuit with LaRC-SI  
flow into via

# Bonding Experiment

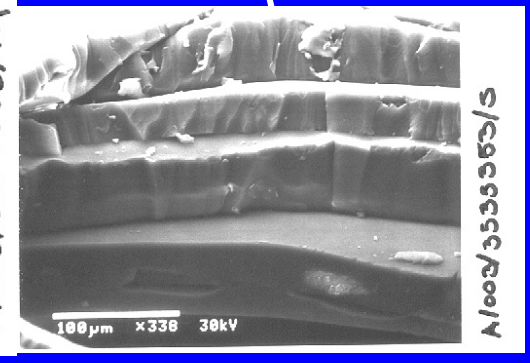
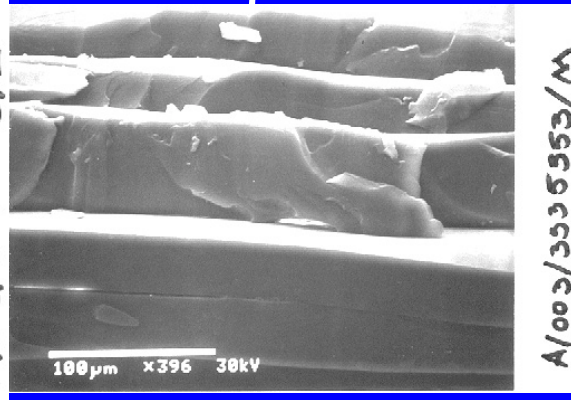
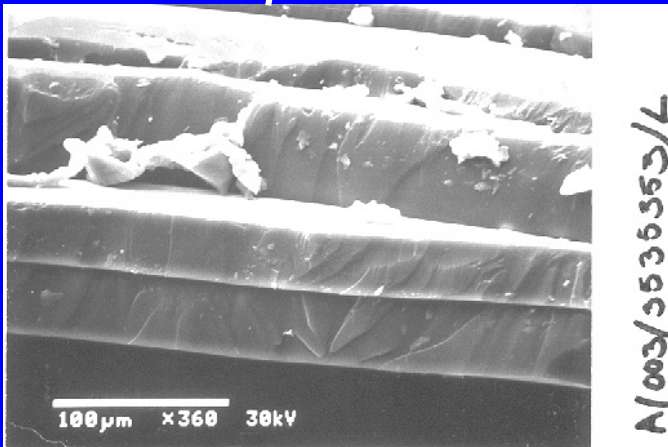
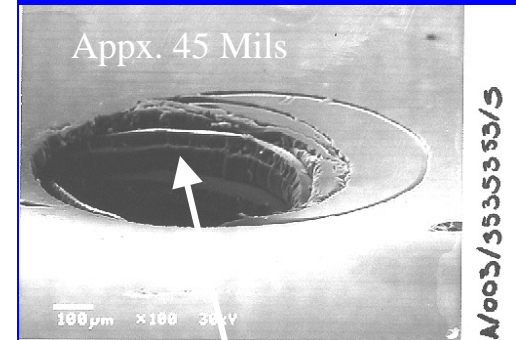
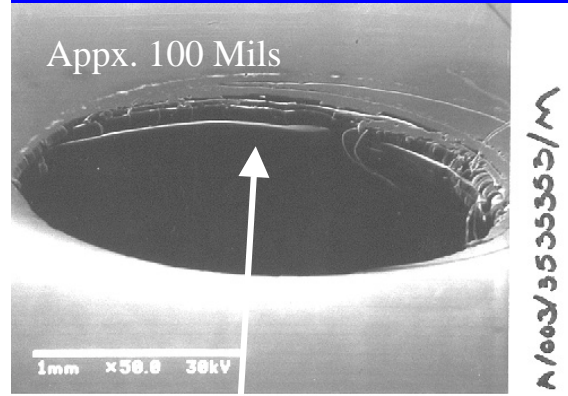
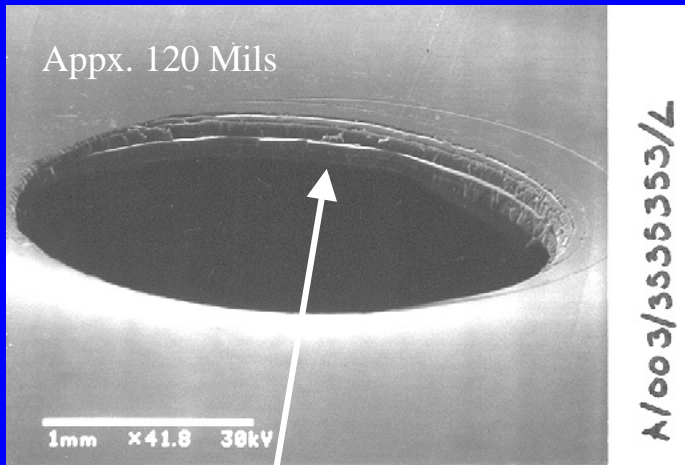
- To determine the precise temperature and pressure needed to perform an adhesiveless melt-bonding multiple layers of film into one homogenous material



# Bonding Experiment Results

Test A/003/3535353; 275C, 100PSI, 1Hr. Soak

SEM Photos:

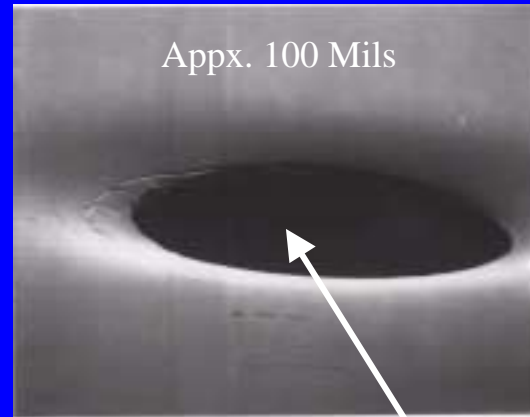
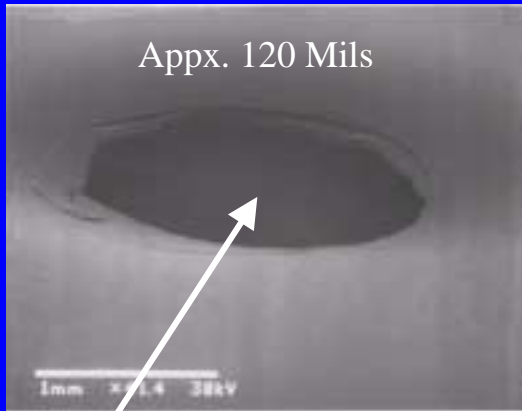




# Bonding Experiment Results

Test A/002/3535353; 300C, 100PSI, 1Hr. Soak

SEM Photos:



# Summary

- 3% offset LaRC-SI material is excellent for forming monolithic circuits and cables
- 3% offset material should not be used for small multi-layer circuit applications where blind vias are needed
- 0.5% offset material results need to be further studied for small multi-layer circuit applications involving blind vias



# Special Acknowledgements

- LaRC-SI film           Greg Draughon
- SEM                     Ralph Stephens
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- GIFTS layout         Michael Holloman
- GAMS layout         James Adams

