LOMSS

Laboratory for Optomechanics and Micro/nano Semiconductor/Photonics Systems

- Measurement of deformation in semiconductor packaging
- Physics of Failure Based Design and Optimization
- Verified/Predictive Modeling
- New Methodology Development

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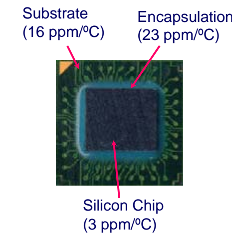
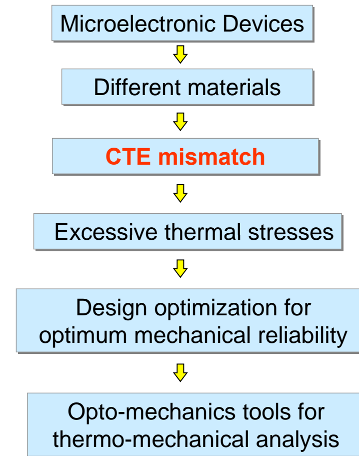
Deformations in Semiconductor Packaging





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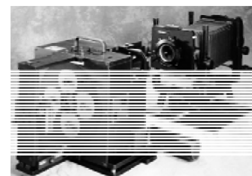
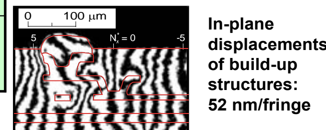
Experimental Methods in Photomechanics

CURRENT CAPABILITIES

In-plane (x,y)	Out-of-plane (z)	Image Processing
Geometric Moiré	Shadow Moiré	O/DFM Method
Moiré Interferometry	Far-infrared Fizeau Interferometry	Phase Shifting Technique
Microscopic Moiré Interferometry	Twyman/Green Interferometry	Fourier Transform Technique

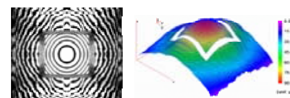


B. Han et al., "Portable Engineering Moiré Interferometer", US Patent No. 5,898,486, April 27, 1999.



In-plane displacements of build-up structures: 52 nm/fringe

MAJOR SPONSORS:
INTEL, Semiconductor Research Corporation, CALCE Industrial Consortium, IBM, Lucent Technologies, Hewlett Packard, Samsung Electronics and Agilent Technologies



Warpage of a silicon device

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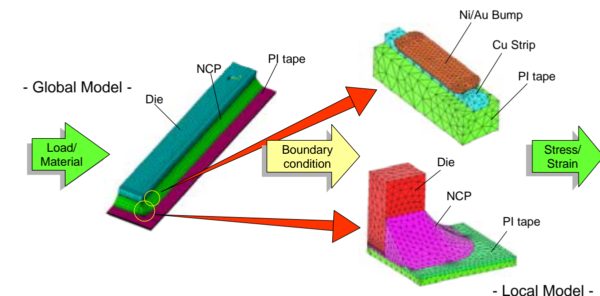
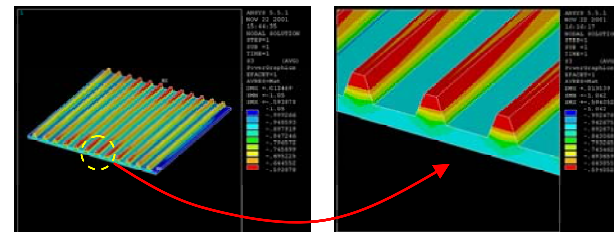
Physics of Failure Based Design Optimization

Chip on Flex





Plasma Display Panel

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Verified/Predictive Modeling

Result from moire interferometry ***Modeling prediction***

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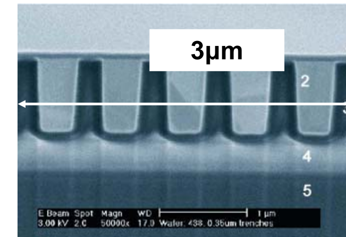
New Methodology Development: Nano-Pattern Recognition and Correlation Technique



- Objective:
  To develop a displacement measurement technique for nanoscale structures
- Technical requirements:
  Measurement sensitivity on the order of ***fraction of nanometer*** on a ***sub-micron length scale***.

www.micromagazine.com/archive/99/10/han.html

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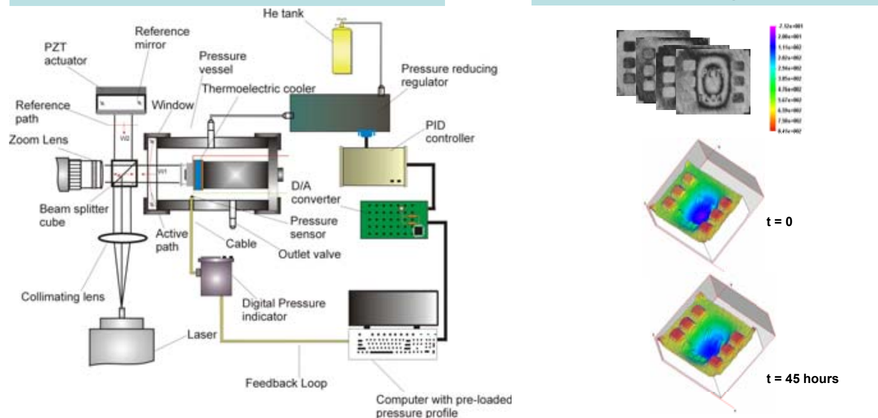
Quantitative Hermeticity Assessment of Micro- to Nano-liter Packages

Experimental setup **Preliminary result**



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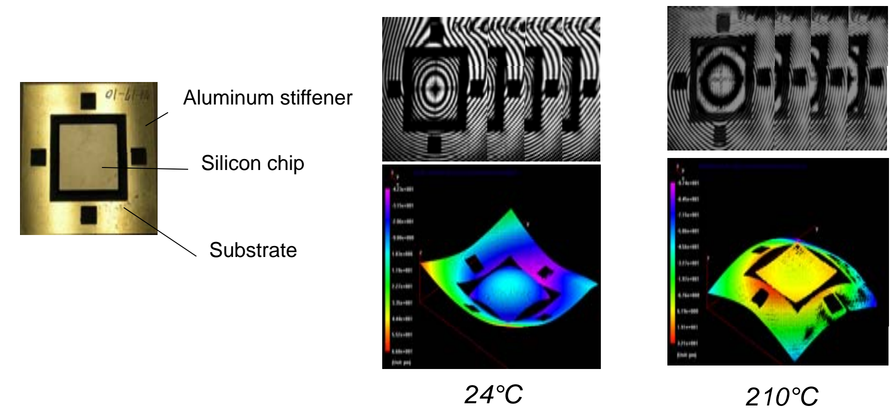
Interferometry at Far Infrared (10.6 μm) Domain



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