LIGA Micromachining at Sandia National Laboratories

Commercialization of Microsystems '99

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Alfredo M. Morales, Jill M. Hruby, Thomas Bennett, Michelle Bankert, Dale R. Boehme, William D. Bonivert, John Hachman, Stewart Griffiths, Robert H. Nilson, Aili Ting, Linda Domeier, Pat Keifer

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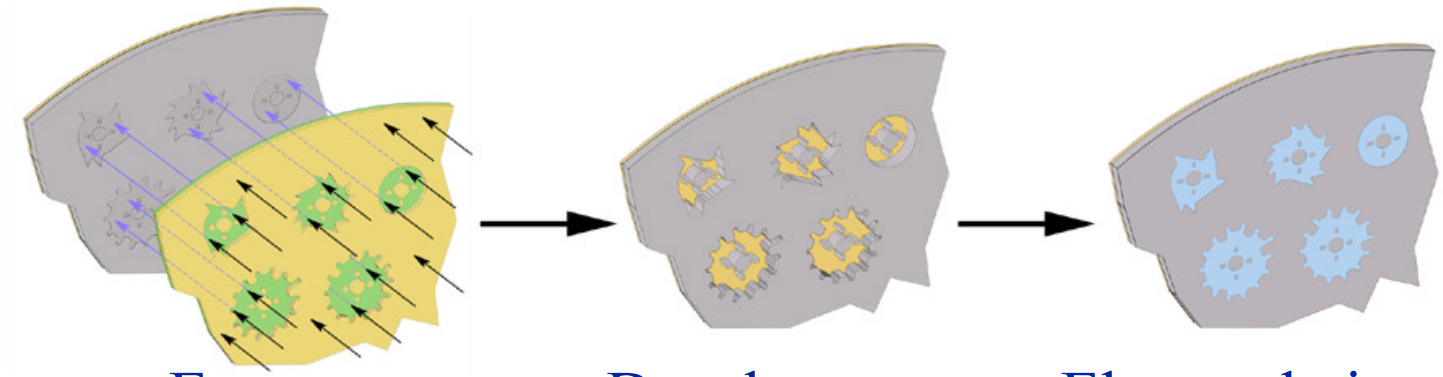
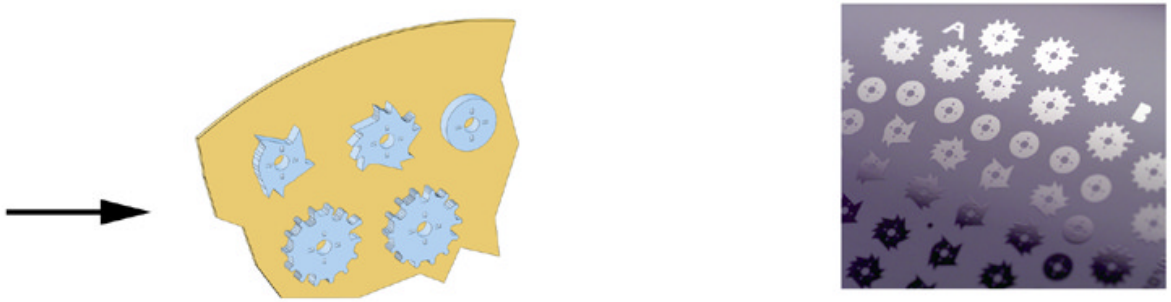
LIGA Technology



Exposure Development Electroplating



Release Sample Microparts

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Sandia has established full-service LIGA facilities

Processing Capabilities

- Dedicated beam lines at ALS and SSRL
- In-house clean room, chemistry lab, and electroplating lab
- Personnel dedicated to individual process steps, including modeling
- Over 180 wafers processed over past year.

Applications

- Defense: low g accelerometers, motors, locks, precision parts
- Miniaturized Instruments: klystrons, mass spectrometers, gas chromatography columns, Faraday cups, wave guides
- Precision devices: heat pipes, plunge EDM tools, fiber alignment

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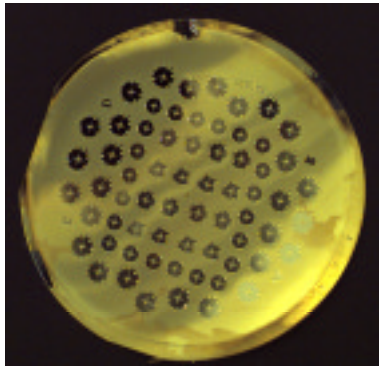
LIGA Processing Capabilities

LIGA Mask



- 100 micron thick silicon wafer
- 3 or 4 inch diameter
- 8 to 35 micron thick gold

LIGA Substrate

- CQ grade Goodfellow PMMA
- Adhered to silicon wafer or oxidized copper
- Fly cut

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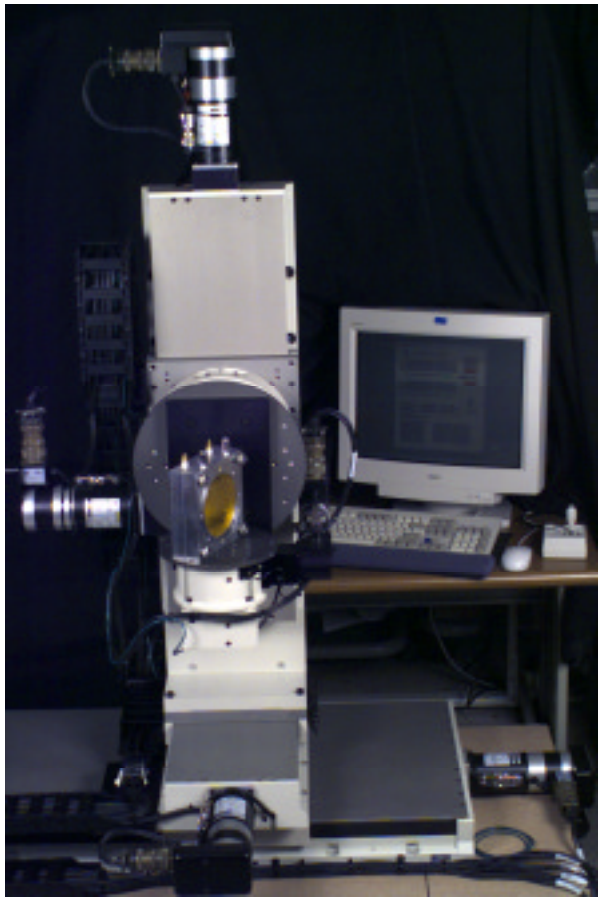
LIGA Processing Capabilities



Beam Lines:

- 3.3.2 at Lawrence Berkeley National Laboratory ALS
- 3.1 at Stanford Synchrotron Radiation Laboratory
- X27B at Brookhaven

Scanner:

- 14 cm (5.5 in) wide, 21 cm (8.5 in) high scan area
- 5 degrees of freedom
- Computer interface

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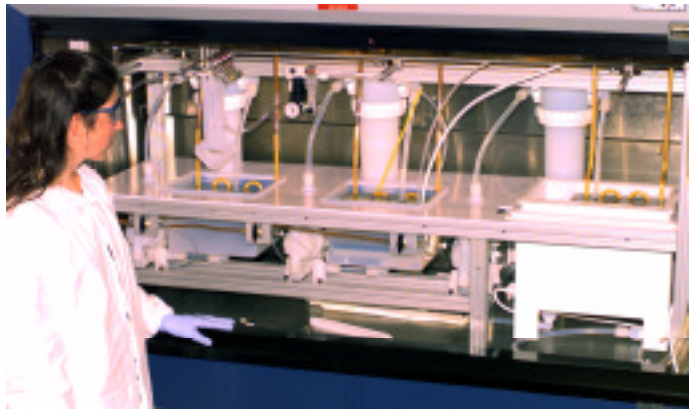
LIGA Processing Capabilities



Development

- Three tanks
- Megasonics
- 0.2 micron filtration

Electroplating

- 16 tank line
- 5 micron filtration
- Computer interface

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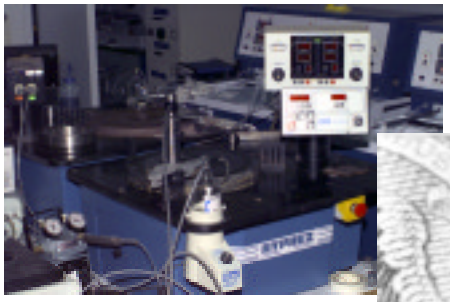
LIGA Processing Capabilities



Planarization

- Engis lapping equipment

Software (internal)

- On-line orders
- Modeling

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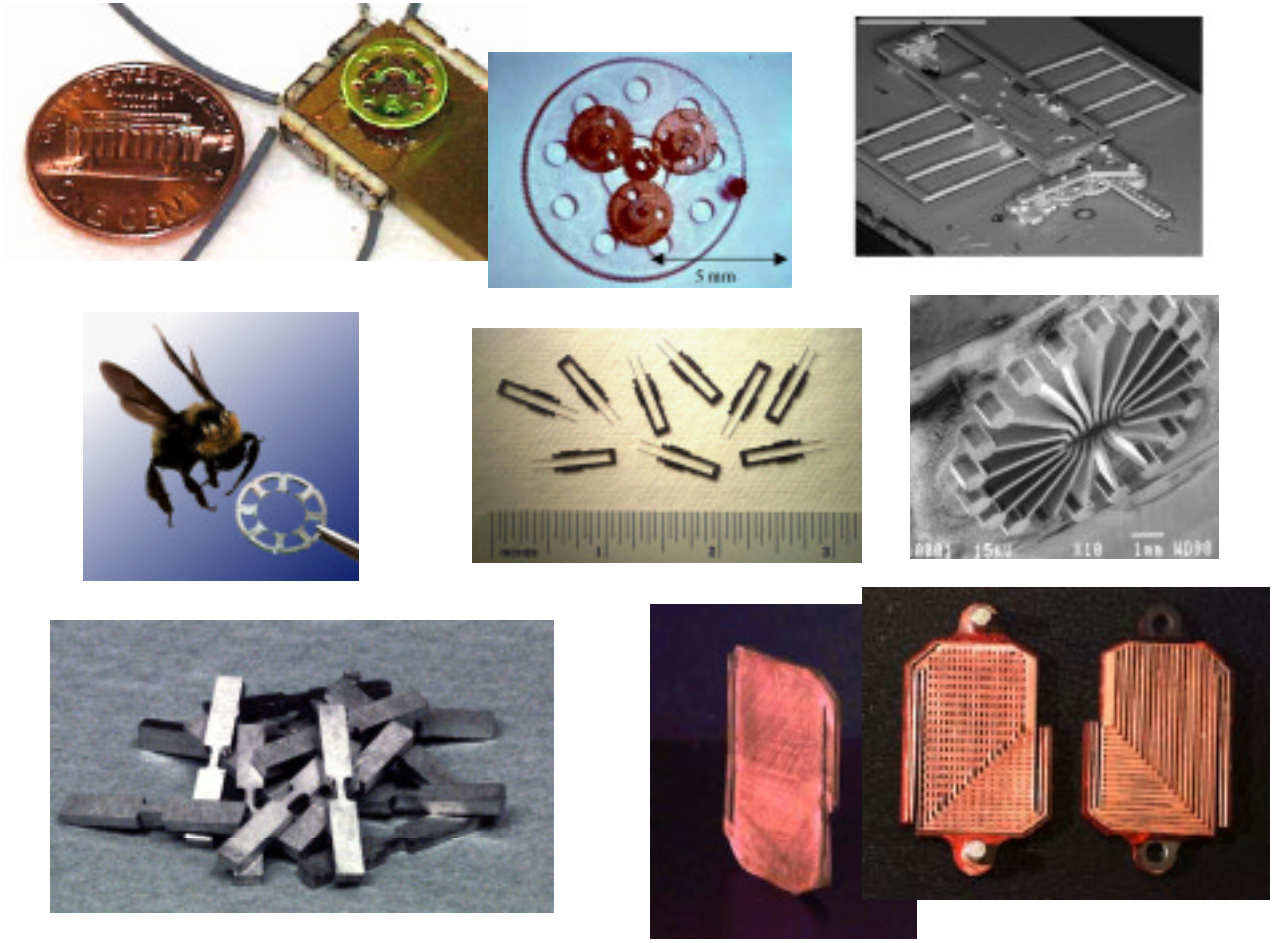
LIGA Microparts



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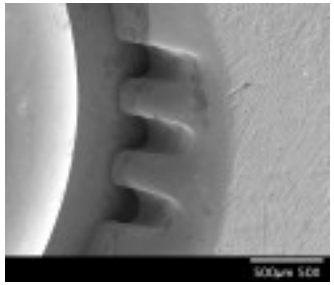
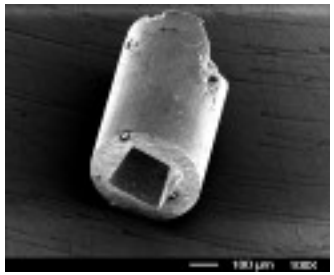
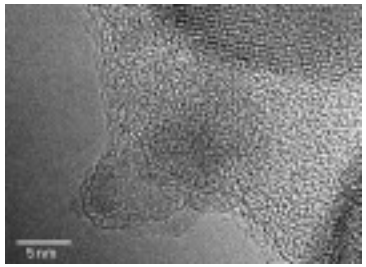
http://daytona.ca.sandia.gov/LIGA/

- Design, processing, assembly, and testing capabilities.
- Large number of microparts has been fabricated.
- Current R&D efforts:
  - Plastic replication
  - Electroplating
  - Process
  - Micromolding of nanocomposites







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