Direct Write Technology

The Electronic Fabrication department is purchasing a new Direct Write system that will enable it to handle parts up to 24 inch by 24 inch by 10 inches in height. This system will enable the department to directly write electronic traces and passive components onto, and embedded into, 3-D structures. A Sandia-funded R&D program has demonstrated the ability to write complex circuitry on 3-D stereolithography parts (see Figs. 1 and 2). This new technology will allow for the rapid prototyping of electromechanical parts.

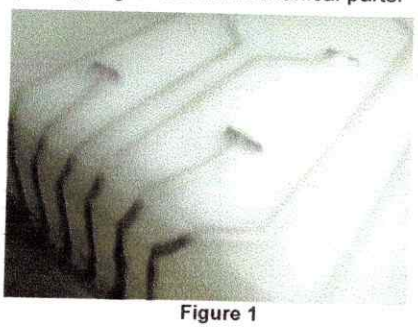

Figure 1

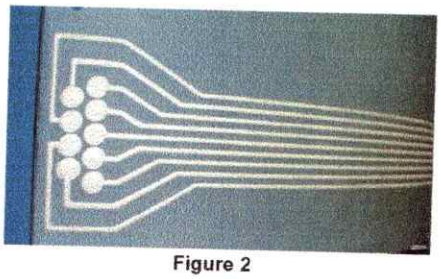

Figure 2

minum wire bonding. Packaged MEMS mirror arrays have been delivered to the customer, and mirror performance has been demonstrated.

The team responsible for this development is comprised of several Sandia National Laboratory employees involved with MEMS design, processing and packaging as well as advanced thin film engineering. This includes the Principal Investigators, E. Garcia and J. DeBassige (Electromechanical Engineering), and department contributors K. Archuleta, R. Torres, B. Wroblewski, C. Hodges, K. Peterson and D. Adams.

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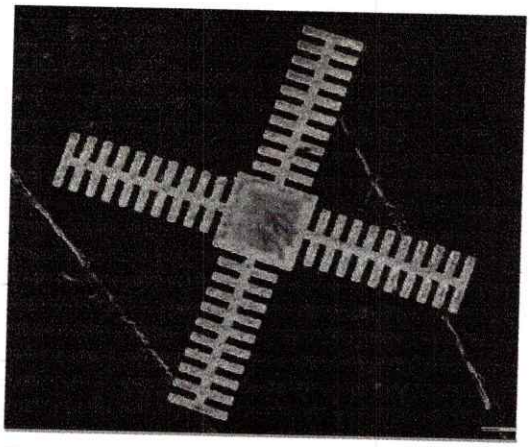
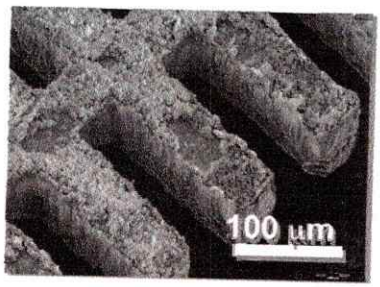
Scanning New Territory with Femtosecond Laser

Continued from page 1

heat influence that could potentially damage or detonate the material. Another innovative effort has begun to investigate the use of the femtosecond laser to selectively release MEMS devices. A new Advanced Manufacturing LDRD will explore femtosecond laser micromachining as a compliment to the LIGA microfabrication process.





The process parameters for this mesoscale windmill were a velocity of 0.42 mm/s; 25 micron layer increments; 125 mm thick SS316 foil. The secondary arms are 100 µm wide with 100 µm spacing. The processing time was 30 minutes.

The Ceramics and Glass department has created both linear and curved optical waveguides buried in glass. As an extension of the optical waveguide, two components have been made, an optical splitter and a directional coupler which couples light from one waveguide to another by means of electromagnetic coupling. In addition, the department is one of the first groups to report on laser induced birefringence in optically transparent media. Laser induced birefringence holds the potential for controlling the polarization of light passing through waveguides. In the future, the department will be working with the microsystems departments to examine the possibility of creating a direct write ring laser. Finally, some initial work has been done using Foturan glass to create buried channels and structures. By exposing specific regions in the Foturan glass to the laser radiation, three dimensional structures (such as micro valves and reaction chambers for sensor applications) can potentially be etched inside the glass.

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Seven Mfg. S&T Center Employees Attend JOWOG-23 Symposium in the UK

Eighteen Sandians from various Centers participated in the recent Neutron Generator/External Neutron Initiator Joint Working Group-23 (JOWOG-23) Symposium at AWE Aldermaston in the UK in June 2004.

A broad range of papers relating to Neutron Generator technology were presented by both the UK and US authors. The primary science and technology areas involved were Neutron Tubes, Active Ceramics, Modeling, and Neutron Generators (both Ferroelectric and Electronic).

Mfg. S&T Center staff were Ron Goeke from Thin Film, Vacuum and Packaging; Tim Gardner, Steve Lockwood, Roger Moore, Scott Reed, Chad Watson, and Pin Yang from Ceramics and Glass. They presented a total of seven papers. The proceedings from the Symposium are being published in two volumes, one containing the UK papers and the other the US papers.

Separate breakout discussions were held to facilitate specific areas of future R&D collaboration between US and UK staff.

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