Initial Characterization and Testing of a Micro-deployable, Silicon-based Iris Structure

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During the Spring Semester of 2006, a team of students from the University of Utah designed a micro-deployable iris structure (see Poster, top left image) as part of an entry into the 2006 Sandia MEMS University Alliance Design Competition. Sandia's CAD tools were used to design the structure to be fabricated using the SUMMIT Process, which uses five mechanical polysilicon layers, four sacrificial silicon oxide layers, and CMP planarization to create complex mechanical systems on a micrometer scale. The device was designed to be opened and closed by Sandia-designed electrostatic comb-drive micromotors. The fabricated device's diameter is just slightly less than the thickness of a dime, or approximately 1.1mm.

Initial characterization work has begun on the microscale iris, using the facilities and equipment in the Utah Microfabrication Core Laboratory. This work has included visual examination with the use of optical microscopy (see Poster, top right image) and scanning electron microscopy (see Poster, middle left image), and optical profilometry.

Functional testing was also conducted using the facilities of Sandia National Laboratories in Albuquerque, NM. Optical microscopy was again used to allow visual analysis during operation of the device and to capture slides for future analysis. During testing, the iris was successfully actuated as designed multiple times. In addition, a few design problems were identified in order to improve the performance of the device for future applications.

This research is being supported with funding from Sandia National Labs University Alliance Program (fabrication, testing, SEM characterization), and The University of Utah, Office of the Vice President for Research, Technology Commercialization Program.

Taylor Meacham is supported by funding from The University of Utah, Undergraduate Research Opportunities Program.