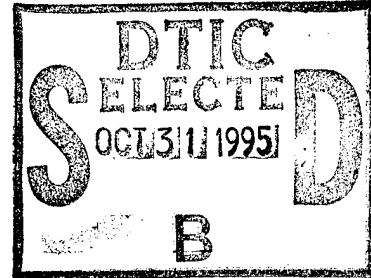


# Silicon Mountain Design

28 February 1995



Office of Naval Research  
Attn: William Miceli, ONR 313, Program Officer  
Ballston Tower One  
800 North Quincy Street  
Arlington, VA 22217-5660

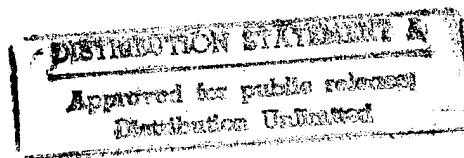
Reference: Contract N00014-94-C-0241  
"An Ultra-High Speed Incoherent-to-Coherent Converter  
for Optical Computing"

In accordance with contract data requirements, enclosed is the monthly status report for the period 1 February - 28 February 1995.

If you have any comments or questions you may contact me at (719) 576-4800.

Sincerely,

David W. Gardner  
Program Manager



Encl.

Copy to: DCMAO Denver  
Director, Naval Research Laboratory, Code 2627  
Defense Technical Information Center (2)  
Ballistic Missile Defense Organization - T/IS

Letter only to: DCMO COS

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**Office of Naval Research  
Arlington, VA  
Contract N00014-94-C-0241**

**Monthly Status Report  
February 1 - February 28, 1995**

**DESCRIPTION**

Many optical computing problems are centered around the processing of incoherent images. These images may be conventional visible light such as those taken with a CCD imager or camcorder. They may also take the form of infrared images in the case of missile seekers or x-ray images from medical or other sources. For optical processing, these images must be converted to either phase or amplitude modulated coherent light. This is typically accomplished by electronically feeding the originally captured image into a spatial light modulator (e.g., liquid crystal or deformable mirror array) and modulating a coherent reference beam with the 2 dimensional data pattern. The electrical input to the SLM creates a data flow bottleneck in the optical processing system due to the inherently serial input architecture. SMD has proposed a novel incoherent to coherent image converter which solves this problem by providing a massively parallel, optical input feed capability. The proposed architecture utilizes a novel combination of micromachining and ultra-thinned wafer technology to achieve an integrated incoherent to coherent image converter. The converter is capable of directly converting UV, IR, visible, and x-ray energy to a coherent light representation allowing for maximum utilization of downstream optical processing.

**FEBRUARY ACTIVITIES**

During February, device fabrication was started. Four - 2" silicon on sapphire wafers and four - 4" silicon on glass wafers were started. Patterning for the pn photosites was completed and the phosphorous and boron implant steps were done. The pn photodiodes are designed with a lateral capture cross-section of approximately 40 microns. With the present fabrication process, 72 SLM arrays and test structures will be generated.

**TO GO ACTIVITIES**

SLM fabrication will be completed in the next 10 days. This will include fabricating the micromachined grating elements over the photosites and removal of the sacrificial layer from beneath the aluminum bars. Completed devices will then be packaged in special test fixtures which will allow for backside and frontside illumination. After packaging, performance testing will begin.

A final report will be prepared and submitted documenting the work done on this program.

**PROBLEMS/CONCERNS**

None

**SCHEDULE/BUDGET**

Device fabrication is currently about two weeks delayed; however, no impact to the overall program completion is anticipated. The program is within budget.

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DEFENSE TECHNICAL INFORMATION CENTER  
CAMERON STATION  
ALEXANDRIA, VIRGINIA 22304-6145

IN REPLY  
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DTIC-OCC

SUBJECT: Distribution Statements on Technical Documents

TO: OFFICE OF NAVAL RESEARCH  
CORPORATE PROGRAMS DIVISION  
ONR 353  
800 NORTH QUINCY STREET  
ARLINGTON, VA 22217-5660

1. Reference: DoD Directive 5230.24, Distribution Statements on Technical Documents, 18 Mar 87.

2. The Defense Technical Information Center received the enclosed report (referenced below) which is not marked in accordance with the above reference.

MONTHLY REPORT  
N00014-94-C-0241  
TITLE: AN ULTRA-HIGH SPEED  
INCOHERENT-TO-COHERENT  
CONVERTER FOR OPTICAL  
COMPUTING

3. We request the appropriate distribution statement be assigned and the report returned to DTIC within 5 working days.

4. Approved distribution statements are listed on the reverse of this letter. If you have any questions regarding these statements, call DTIC's Cataloging Branch, (703) 274-6837.

FOR THE ADMINISTRATOR:

1 Encl

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Chief, Cataloging Branch

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The cited documents has been reviewed by competent authority and the following distribution statement is hereby authorized.

<p><u>A</u> (Statement)</p>	<p>OFFICE OF NAVAL RESEARCH CORPORATE PROGRAMS DIVISION ONR 313 800 BRIGHT QUINCY STREET ARLINGTON, VA 22217-5660</p>	<p>_____ (Controlling DoD Office Name)</p>
<p>_____ (Reason)</p> <p><i>Debra T. Hughes</i> (Signature &amp; Typed Name)</p>	<p>DEBRA T. HUGHES DEPUTY DIRECTOR CORPORATE PROGRAMS OFFICE</p> <p>_____ (Assigning Office)</p>	<p>_____ (Controlling DoD Office Address, City, State, Zip)</p> <p>19 SEP 1985</p> <p>_____ (Date Statement Assigned)</p>