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3. DISTRIBUTION / AVAILABILITY OF REPORT

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1a. NAME OF PERFORMING ORGANIZATION

University of Michigan

6b. OFFICE SYMBOL
(If applicable)

7a. NAME OF MONITORING ORGANIZATION

AFOSR/NE

1c. ADDRESS (City, State, and ZIP Code)

DRDA, ISR Building 3, Room 1312
475 E. Jefferson
Ann Arbor, MI 48109-1248

7b. ADDRESS (City, State, and ZIP Code)

Building 410
Bolling AFB, DC 20332-64488a. NAME OF FUNDING / SPONSORING
ORGANIZATION

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(If applicable)

NE

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Building 410
Bolling AFB, DC 20332-6448

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11. TITLE (Include Security Classification)

Multipurpose 2000°C Furnace for Physical Testing in Controlled Atmosphere

12. PERSONAL AUTHOR(S)

I-Wei Chen

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Final Report

13b. TIME COVERED

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

A high temperature (2000°C) furnace and a servohydraulic test frame were purchased and installed for physical testing in controlled atmospheres of structural ceramics made superplastic by advanced ceramic processing.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT

☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS

21. ABSTRACT SECURITY CLASSIFICATION

Unclassified

22a. NAME OF RESPONSIBLE INDIVIDUAL

Dr. Liselotte Schioler

22b. TELEPHONE (Include Area Code)

(202) 767-4933

22c. OFFICE SYMBOL

NE

A research equipment grant entitled "Multipurpose 2000°C Furnace for Physical Testing in Controlled Atmosphere", Grant No. AFOSR-89-0127, was awarded by the U.S. Air Force Office of Scientific Research, on November 1, 1988, for a period of 12 months. The amount of the award was \$45,000. The program manager was Dr. Liselotte J. Schioler of Bolling AFB, DC 20332-6448. The grantee, The University of Michigan, had agreed to contribute \$22,688 to the project.

The following items of equipment were purchased using the fund from the award and the University of Michigan's contribution:

(A) One (1) Centorr Model M60-3x6-W-D-02S2-A-20 2000°C vacuum and controlled atmosphere front loading furnace system with side/side laser ports, plus two (2) 1/2 quartz window assemblies. Total cost \$47,000.

(B) One MTS load frame, model 318.10, rated at 22,000 lb. with hydraulic crosshead lifts and manual locks, one MTS Model 244.22 Hydraulic actuator, one MTS 661.20 load cell, 1 MTS model 298.10 Hydraulic Service Manifold, and one MTS Model 252.21 Servovalve rated at 1GPM. Total cost \$22,688.

The above was delivered and installed at the University of Michigan in the Ceramic Laboratory in October 1989. Together, they provide a facility for physical testing in controlled atmospheres for temperatures up to 2000°C.

The facility has been used for the following research projects of interest to US DOD:

1. Superplastic Forming of Zirconia-containing and Silicon-nitride Containing Ceramics-- This effort is supported by the AFOSR Grant No. 87-0289. Superplastic zirconia has been successfully formed under biaxial tension using this facility. We are currently preparing silicon nitride ceramics to explore the same possibility.

2. Superplastic Studies of Alumina-containing Ceramics--This effort is supported by the ARO contract No. DAAL 03-89-K-0133. We have prepared fine-grained alumina by low temperature sintering and are currently in the process of testing said ceramics to evaluate their superplastic properties.

