AD-A216 513

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	September 1, 1984	7/1/83-7/31/84 Final Report

4. TITLE AND SUBTITLE
ULTRASTRUCTURAL PROCESSING OF CERAMICS, GLASSES AND COMPOSITES

5. FUNDING NUMBERS
61102F
2917/A2

6. AUTHOR(S)
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AFOSR-TR- 89-1798

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
University of Florida
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8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
AFOSR
BLDG 410
BAFB DC 20332-6448

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
AFOSR-83-0287

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

14. SUBJECT TERMS	15. NUMBER OF PAGES: 3
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
unclassified	unclassified		

NSN 7540-01-280-5500
Standard Form 298 (890104 Draft)
Prescribed by ANSI Std. 239-18
298-01

Scientific Report

to

United States Air Force
Air Force Office of Scientific Research
Building 410
Bolling Air Force Base, DC 20332

Grant No. AFOSR-83-0287

ULTRASTRUCTURE PROCESSING OF CERAMICS, GLASSES AND COMPOSITES

Submitted by

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Gainesville, FL 32611

September 1, 1984

Introduction

The purpose of this $100,000 grant was to purchase an Inductively Coupled Plasma (ICP) Chemical Analysis System, a Fourier Transform InfraRed Gas Cell Accessory, and other accessories for the characterization of chemically processed ceramics, glasses, and composites. (AW)

Equipment Purchased

After review of various manufacturers of ICP equipment competitive bids were received (U of F Bid #B4-133) and the purchase was made from the Instrumentation Laboratory (IL) Corp., 2410 Park Central Blvd., Decatur, Georgia 30035. The amount was $72,400.

Other major equipment items purchased to complement the ICP for chemical characterization were: DuPont Thermomechanical Analyzer, $12,550; Pt crucible and cover from Johnson Matthey, $4,212; miscellaneous laboratory accessories from Fisher Scientific and Instron Corp totalling $5,838; and a FTIR Diffuse Reflection Stage Model 3-D and Vacuum Chamber for $5,000 from Barnes Analytical, 652 Glenbrook Rd., P. O. Box 2190G, Stamford, Connecticut 06906.

Research Projects

The above instruments have been used primarily on the Multi-Investigator Research Project "Ultrastructure Processing and Environmental Stability of Advanced Structural and Electronic Materials", Contract #F49629-83-C-0072.

The ICP has been used to analyze the starting metal organic constituents in our sol-gel research. We have been able to show ppb level of purity of the starting materials. We also have used the ICP in studying mechanisms of glass corrosion and environmental interactions.

The analytical accessories from DuPont, Johnson Matthey, Fisher and Instron have also been used to determine structural changes in the sol-gel materials and compare them with glasses and glass-ceramics made from standard glass-melting methods.

The FTIR stage has made it possible to follow the chemical structural changes occurring in the liquid reactions of sol-gels and during drying and densification.