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July 20, 1998

Dr. Michael R. Berman, Program Manager
Directorate of Chemistry and Materials Science
Department of the Air Force
Air Force Office of Scientific Research (AFOSR)
Bolling Air Force Base
Washington, DC 20332-6448

Dear Michael:

Enclosed is my final technical report for my AFOSR DURIP'97 grant #F49620-97-1-0186.

Best regards,

Richard J. Saykally
Professor of Chemistry

RJS:ewp

Enclosures

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REPORT DOCUMENTATION PAGE

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1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	20 July 98	Final Technical Report (4/1/97-3/31/98)

4. TITLE AND SUBTITLE

DURIP97 Infrared Cavity Ringdown Laser Absorption Spectroscopy: Metal-Containing Clusters and HEDM Molecules

5. FUNDING NUMBERS

#F49620-97-1-0186

6. AUTHOR(S)

Richard J. Saykally

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

University of California
Department of Chemistry
Berkeley, CA 94720-1460

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

AFOSR/NL
110 Duncan Ave., Room B115
Bolling AFB, DC 20332-8050

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

A high resolution infrared cavity ringdown laser absorption spectrometer has been developed to study proposed HEDM molecules and metal containing clusters. Using a novel tunable pulsed Alexandrite ring laser, we are able to generate tunable visible radiation with ca. 40 MHz bandwidth. This tunable visible light is downconverted to the infrared using stimulated Raman scattering in H_2 and D_2. With this system, tunable radiation from the UV to the far infrared can be generated with ca. 100 MHz bandwidth. We will test this system using our pulsed supersonic laser vaporization source to study both metal and carbon containing species. Infrared Cavity Ringdown Spectroscopy has also been used to study water clusters in both pulsed supersonic beams and pulsed discharged nozzles.

14. SUBJECT TERMS

HEDM species, carbon cluster species, high resolution infrared cavity ringdown spectroscopy, pulsed discharge

15. NUMBER OF PAGES

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	UNCLASSIFIED	UNLIMITED

FINAL TECHNICAL REPORT

AFOSR DURIP'97
GRANT NO. F49620-97-1-0186

"DURIP97 Infrared Cavity Ringdown Laser Absorption Spectroscopy: Metal-Containing Clusters and HEDM Molecules"
(Period Covered: 04/01/97 – 03/31/98)

Richard J. Saykally - Principal Investigator
Department of Chemistry
University of California, Berkeley
Berkeley, CA 94720-1460

In the original DURIP grant we requested a Continuum Mirage OPA System with a Coherent Infinity Pump Laser System, as well as a Laser Vision DFG package. With this system we would be able to perform cavity ringdown laser absorption spectroscopy experiments from the UV to about 16.0 μm with ca. 150 MHz spectral resolution.

Since the proposal was funded we have designed a new approach around a different high resolution pulsed laser – the Light Age Alexandrite System. This laser produces pulses with ca. 40 MHz linewidths and pulse energies near 150 mJ – considerably higher spectral resolution than obtainable from the OPA System, with much greater convenience. This system operates in the range 700-800 μm, necessitating a Raman shifting scheme to obtain IR wavelengths. We have designed an appropriate system that will in principle allow coverage from FIR to UV with very narrow bandwidths. The rest of the equipment charges are minor. The system is currently being tested.

AFOSR DURIP'97
ACQUIRED EQUIPMENT

GRANT NO. F49620-97-1-0186
TOTAL GRANT AMOUNT $245,000
(04/01/97 - 03/31/98)

NAME	MANUFACTURER	COSTS
Coating for Reflective IR Mirrors	Laser Power Optics	$ 18,950.89
Power Mac 6500 Computer System and Apple Color Stylewriter 2500	The Scholar Workstation	3,224.77
Coating for Reflective IR Mirrors	Laser Power Optics	10,825.00
Pulsed Alexandrite Laser/Pulsed Ring Oscillator System	Light Age Inc.	199,180.00
HI Hurricane I Computer System	Human Ingenuity Industries	1,403.05
Tektronix Field Upgrade Kit	Allied Electronics	568.31
HI Hurricane I Computer System	Human Ingenuity Industries	1,171.27
Power Mac 6500 Computer System	The Scholar Workstation	1,790.46
Stabilizer Vibration Isolators (4 sets)	Newport Corporation	3,823.24
Coating for Reflective IR Mirrors	Laser Power Optics	4,199.97
Total Equipment Costs		$245,136.96