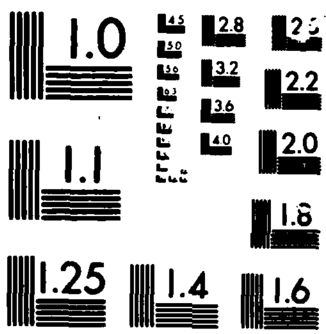
AD-A167 277 MOLECULAR MECHANICS OF SUBMICRON THIN MONOMERIC AND POLYMERIC MOLECULAR FILMS(U) STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY P N PRASAD 31 MAR 86 1/1

UNCLASSIFIED AFOSR-TR-86-0228 AFOSR-84-0281 F/G 11/9 NL



MICROCOP CHART

DTIC ELECTE MAY 0 1 1986 S D

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

AD-A167 277

DTIC FILE COPY

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release Distribution unlimited
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S) AFOSR-TR- 86-0228
6a. NAME OF PERFORMING ORGANIZATION: State University of NY, Buffalo / 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION: AFOSR/NC
6c. ADDRESS (City, State and ZIP Code) Department of Chemistry Buffalo, NY 14214	7b. ADDRESS (City, State and ZIP Code) Bldg 410 Bolling AFB, DC 20332-6448
8a. NAME OF FUNDING/SPONSORING ORGANIZATION: AFOSR / 8b. OFFICE SYMBOL (If applicable): NC	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER: AFOSR-84-0281
8c. ADDRESS (City, State and ZIP Code) Bldg 410 Bolling AFB DC 20332-6448	10. SOURCE OF FUNDING NOS. PROGRAM ELEMENT NO.: 61102F; PROJECT NO.: 2917; TASK NO.: A2; WORK UNIT NO.:

11. TITLE (Include Security Classification) Molecular Mechanics of Submicron Thin Monomeric and Polymeric Molecular Films

12. PERSONAL AUTHOR(S) Paras N. Prasad

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Yr., Mo., Day)	15. PAGE COUNT
Final	FROM 30Jul 84 TO 29 Jul 85	31 March 86	4

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB. GR.	picosecond laser non-linear optical effects

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

This grant, through the DOD-University Instrumentation Program, was provided to acquire a picosecond laser system for the study of non-linear optical effects as well as for structural characterization of submicron films. The laser system consists of a CW mode-locked Nd-Yag laser (Spectra-Physics, Model 3000), the output of which, after frequency doubling, is split by a 50% beam splitter to sync pump two dye lasers (Spectra-Physics, Model 375). The outputs from these dye lasers are fed into two amplifiers (Quanta Ray, Model

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS ☐	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL DONALD R. ULRICH	22b. TELEPHONE NUMBER (Include Area Code): 767-4960 / 22c. OFFICE SYMBOL: NC

DD FORM 1473, 83 APR   EDITION OF 1 JAN 73 IS OBSOLETE.

SECURITY CLASSIFICATION OF THIS PAGE

cont'd

PDA) which are pumped by the second harmonic of a 20Hz pulsed Nd-Yag laser (Quanta-Ray, Model DCR-2A). The amplified pulses are 7ps wide with 0.5mJ of pulse energy. The laser system has proven to be extremely versatile and, therefore, valuable for a number of different experiments. This arrangement also gives us the choice to generate tunable picosecond u.v. and IR pulses by mixing either of two dye laser beams with the fundamental from the pulse Yag laser. FINAL REPORT, Molecular Mechanics of Submicron Thin Monomeric and Polymeric Molecular Films, AFOSR-84-0281.

AFOSR-TR- 86-0228

APR 9 1986

FINAL REPORT

PROJECT: Molecular Mechanics of Submicron Thin Monomeric and Polymeric Molecular Films

SPONSOR: USAFOSR

GRANT NUMBER: AFOSR840281

PRINCIPAL INVESTIGATOR: Dr. Paras N. Prasad

Professor

Department of Chemistry

State University of New York at Buffalo

Buffalo, NY 14214

86 6

This grant, through the DOD-University Instrumentation Program, was provided to acquire a picosecond laser system for the study of non-linear optical effects as well as for structural characterization of submicron films.

First, the laser system acquired by this grant is described. The picosecond laser system is schematically shown in Figure 1. It consists of a CW mode-locked Nd-Yag laser (Spectra-Physics, Model 3000), the output of which ,after frequency doubling, is split by a 50% beam splitter to sync pump two dye lasers (Spectra-Physics, Model 375). The outputs from these dye lasers are fed into two amplifiers (Quanta Ray, Model PDA) which are pumped by the second harmonic of a 20Hz pulsed Nd-Yag laser (Quanta-Ray, Model DCR-2A). The amplified pulses are 7ps wide with 0.5mJ of pulse energy. This laser system has proven to be extremely versatile and, therefore, valuable for a number of different experiments.

For degenerate four-wave mixing experiments, which probe the third-order non-linear optical effects in films, only the beam (ν_1) from one dye laser is used and split in three ways. For picosecond transient grating experiments, we use both beams ν_1 and ν_2. Beam ν_1 is split in half and crossed at an angle in the sample to form the grating. Beam ν_2, with a variable line delay, is used to diffract from the grating.

This arrangement also gives us the choice to generate tunable picosecond u.v. and IR pulses by mixing either ν_1 or ν_2 with the fundamental from the pulse Yag laser.

So far, the work completed using this instrumentation has resulted in three scientific papers. One paper has been published, the second one is in press and the third paper has just been submitted for publication. Two copies of the reprints and preprints of these works are enclosed.

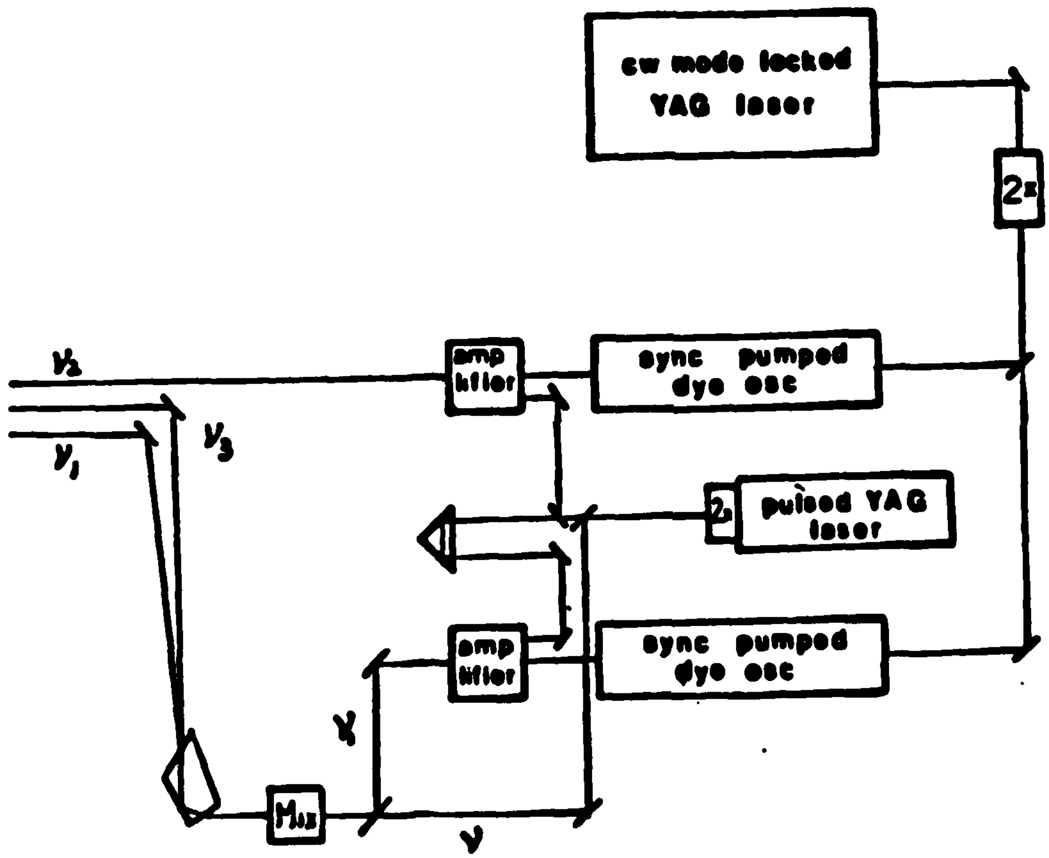

cw mode locked
YAG laser
2x
sync pumped
dye osc
amp
lifier
pulsed YAG
laser
sync pumped
dye osc
amp
lifier
ν_2
ν_3
ν_1
Mix
ν

Figure 1

Grant funds were used to purchase a PICO II CARS laser system consisting of the following elements:

1 Model 3460 CW YAG Laser Head and Model 3450 Power Supply

1 Model 342A-08 Mode Locker SYstem

2 Model 375B-81 CW Dye laser Including Model 376B Circulator, Tested and Shipped with R6G, Including 2 Plate Birefringent Filter

1 Model DCR-2A(30)Nd:YAG Laser (Oscillator and Amplifier, 30Hz)

2 Model PDA-1 Pulsed Dye Amplifier

1 Beam Bending Mirror Set (G0050-008-set of 2)

Total System cost was $125,000

END

FILMED

DTIC

6-86