**REPORT DOCUMENTATION PAGE**

1. AGENCY USE ONLY (Leave blank) | 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED
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4. TITLE AND SUBTITLE

   Final Report for: Chemistry and Physics in Multilayer Assemblies and Thin Films of Redox Species

5. FUNDING NUMBERS

   Grant # N00014-90-J-1167
   R&T Code 4133019

6. AUTHOR(S)

   Daniel A. Buttry

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

   Department of Chemistry, University of Wyoming
   Laramie, WY 82071-3838

8. PERFORMING ORGANIZATION REPORT NUMBER

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

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   Chemistry Division
   800 N. Quincy Street
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   Final report #2

11. SUPPLEMENTARY NOTES

   Final Report

12a. DISTRIBUTION/AVAILABILITY STATEMENT

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12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

   Final Report describing work on title grant. Includes listing of students and postdocs supported, publications, presentations, and Financial Status Report.

14. SUBJECT TERMS

   Electrochemistry

15. NUMBER OF PAGES

   6

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT

   unclassified

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   unclassified

19. SECURITY CLASSIFICATION OF ABSTRACT

   unclassified

20. LIMITATION OF ABSTRACT

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Standard Form 298 (Rev 2-89)
**FINANCIAL STATUS REPORT** (Short Form)

1. Federal Agency and Organizational Element to Which Report is submitted
   ONR

2. Federal Grant or Other Identifying Number Assigned
   836000331

3. Recipient Organization (Name and complete address, including ZIP code)
   University of Wyoming, Contracts & Grants Accounting
   Box 3355, University Station, Laramie, WY 82071

4. Employer Identification Number
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5. Recipient Account Number or Identifying Number
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6. Final Report
   □ Yes  □ No

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   2/29/96
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   2/29/96

9. Period Covered by this Report
   From: (Month, Day, Year)
   10/1/89
   To: (Month, Day, Year)
   2/29/96

10. Transactions:

   a. Total outlays
      0.00  781,174.00  781,174.00
   b. Recipient share of outlays
      0.00  0.00  0.00
   c. Federal share of outlays
      0.00  781,174.00  781,174.00
   d. Total unliquidated obligations
      0.00
   e. Recipient share of unliquidated obligations
      0.00
   f. Federal share of unliquidated obligations
      0.00
   g. Total Federal share (Sum of lines c and I)
      781,174.00
   h. Total Federal funds authorized for this funding period
      781,174.00
   i. Unobligated balance of Federal funds (Line h minus line g)
      0.00

11. Indirect Expense

   a. Type of Rate (Place "X" in appropriate box)
      □ Provisional  □ Predetermined  □ Final  □ Fixed

   b. Rate
      See Below

   c. Base
      492,782.41

   d. Total Amount
      197,244.54

   e. Federal Share
      197,244.54

12. Remarks: Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation.

   39% MTDC of 239,812.64  93,526.93
   41% MTDC of 201,969.77  82,807.61
   41% MTDC of 51,000.00  20,910.00

13. Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays and unliquidated obligations are for the purposes set forth in the award documents.

   Typed or Printed Name and Title
   Christy Rickard, Manager
   Contracts & Grants Accounting

   Telephone (Area code, number and extension)
   (307)766-3131

   Signature of Authorized Certifying Official
   Christy Rickard

   Date Report Submitted
   03/19/96
OFFICE OF NAVAL RESEARCH

FINAL REPORT

PUBLICATIONS/PATENTS/PRESENTATIONS/HONORS/STUDENTS REPORT

for

GRANT #: N00014-90-J-1167

R&T Code: 4133019

Chemistry and Physics in Monolayer Assemblies and Thin Films of Redox Species. Electric Field Effects, Chemical Reactivity, and Interadsorbate Interactions

Professor Daniel A. Buttry
Department of Chemistry
University of Wyoming
Laramie, WY 82071-3838

June 13, 1996

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Objective, approach and conclusions of the effort

The objective of the effort was to study the influence of the interfacial environment at electrode surfaces on the behavior of molecules present at the surface. The main approach was to use the self-assembly method to immobilize fluorescent probe molecules at the surface and then to spectrally interrogate these probe molecules to learn about their response to electrochemically induced changes in the interfacial environment. This effort resulted in the first direct experimental determination of electric field intensities at electrode surfaces.

Listing of all undergraduate and graduate students and postdoctoral fellows supported

Undergraduate students
None

Graduate students
Tom Schneider (Ph.D., 1993).
Shauna Hiley (Ph.D., 1993).
Xiaoyan Tang (Ph.D., 1994).
Chien-Ming (Jimmy) Peng (Ph. D., 1995).
John Pope (Ph. D., 1995).
James Walker (Ph.D. expected 1997).

Postdoctoral fellows
Dr. Guoying Chen
Dr. Sandra Kimbrell

Professor Zheng Tan (from Changchun Institute of Applied Chemistry, PRC)

Listing of publications, presentations, patents and reports

Publications (see also publications that are under revision listed as Reports below)

Presentations

Patents
None

Reports
See publication list above, plus (note these will be published in the coming year).

List of transitions
None

Highlights

Publications
   This publication described the first direct, unambiguous measurements of electric fields at electrode surfaces. It revealed that the details of the interfacial structure in adsorbate layers has a profound influence on interfacial electric fields.

   This paper demonstrated that it is possible to use rational chemical approaches to manipulate the transport of ionic species in polymer systems. The finding has relevance in technological areas ranging from solid polymer electrolytes e.g. in fuel cells) to thin-film batteries.

   This contribution was the first demonstration of the reactions of amines with vinyl groups at carbon fiber surfaces. It presented a new model for adhesion in carbon fiber/epoxy composite materials.

Awards
1) Elected to serve on the Editorial Board of Langmuir.
2) Received a Senior Research Fellowship from the Japan Society for the Promotion of Science to visit Japan in 1995.

Presentations