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2

2. REPORT DATE  
12-31-92

3. REPORT TYPE AND DATES COVERED  
FINAL REPORT - 11-1-89 to 12-31-92

4. TITLE AND SUBTITLE  
"Polymers by Non-Redox Processes: Synthesis, Physical Studies and Application"

5. FUNDING NUMBERS  
GRANT No.  
N00014-90-J-1559

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8. PERFORMING ORGANIZATION REPORT NUMBER  
  
FINAL REPORT

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)  
Sponsoring Agency: DARPA  
3701 N. Fairfax Drive  
Arlington, VA 22203-1714  
Monitoring Agency: ONR  
800 N. Quincy Street  
Arlington, VA 22217-5000

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES  
This is the Final Report for Grant No. N00014-90-J-1559, covering the period November 1, 1989 to June 30, 1992 with a no-cost extension to December 31, 1992.

12a. DISTRIBUTION AVAILABILITY STATEMENT  
Approved for Public Release

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)  
Includes a recapitulation of the research carried out during the time period of the Grant listed above, plus a complete list of 112 Technical Reports, 23 Patents Filed a/o Issued, and a complete listing of all personnel paid in whole or in part by the grant (and the previously "connected" Contract No. N00014-86-K-0766 covering period 9-16-86 to 10-31-89).

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14. SUBJECT TERMS

15. NUMBER OF PAGES  
23 (plus this pg)

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT  
Unclassified

18. SECURITY CLASSIFICATION OF THIS PAGE  
Unclassified

19. SECURITY CLASSIFICATION OF ABSTRACT  
Unclassified

20. LIMITATION OF ABSTRACT  
UL

**GRANT NO. N00014-90-J-1559**

**"Polymers By Non-Redox Processes:  
Synthesis, Physical Studies  
and Application"**

**FINAL REPORT**

**NOVEMBER 1, 1989 - JUNE 30, 1992**

**[ NO-COST EXTENSION TO DECEMBER 31, 1992 ]**

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**93-02833**

The work covered by this grant (Grant No. N00014-90-J-1559) is a continuation of the work supported by Contract No. N00014-86-K-0766.

The work covered by the grant from November 1, 1989 to June 30, 1992 is summarized by the Technical Reports listed below.

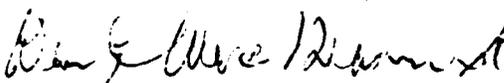
Patents carried by both Contract No. N00014-86-K-0766 and Grant No. N00014-90-J-1559 are listed below.

Also listed are the names of all personnel who received stipends resulting in whole or in part from funds available either from the contract, the grant, or from both.

NOTE: Work covered by the Contract No. N00014-86-K-0766, from September 16, 1986 to October 31, 1989, is described by publications included the Final Report for Contract No. N00014-86-K-0766.

#### SUMMARY:

This interdisciplinary research involving synthetic chemistry, electrochemistry, structural studies and physics has involved the conducting polymer, polyaniline, and its derivatives almost exclusively. It has proven to be enormously successful and has been probably the underlying force in taking the polyaniline field of conducting polymers from more or less a laboratory curiosity to technical production and sales. At the commencement of the project, the constitution of this varied oxidation state class of conducting polymers, their chemical purity and oxidative purity were unclear. The analytically and oxidatively pure three distinct oxidation states have been synthesized and characterized. Free-standing stretch-aligned partly crystalline films and fibers with greatly enhanced conductivity have been obtained, thus demonstrating for the first time the processibility of polyaniline and its derivatives. Structural, magnetic, optical and transport studies have shown that doped polyaniline has a half-filled polaron conduction band and that it possesses metallic-type conductivity in its crystalline domains.

  
Alan G. MacDiarmid  
December 4, 1992

**112 TECHNICAL REPORTS**  
**&**  
**23 PATENTS**

**SUPPORTED IN WHOLE OR IN PART**  
**BY URI GRANT FROM**  
**11/1/89 THROUGH 6/30/92**

GRANT NO.: N00014-90-J-1559

**"POLYMERS BY NON-REDOX PROCESSES:  
SYNTHESIS, PHYSICAL STUDIES  
AND APPLICATION"**

NOVEMBER 1, 1989 to JUNE 30, 1992

**No-Cost Extension to DECEMBER 31, 1992**

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**TOTAL TECHNICAL REPORTS = 112****TECHNICAL REPORTS - 1990 = 36**

- 1990-1 "New Developments In the Synthesis and Doping of Polyacetylene and Polyaniline," in Conjugated Polymeric Materials: Opportunities in Electronics, Optoelectronics and Molecular Electronics, J.L. Bredas and R.R. Chance, Eds., (Kluwer Academic Publishers, Dordrecht, Holland), p. 53 (1990), A.G. MacDiarmid and A.J. Epstein.
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