

ومولول توفر تبعر الرمالية الريالية الروالية المعالية الريالية المراجع

MICROCOPY RESOLUTION TEST CHARI

AD-A183 590

UTIC EILE COPY

OFFICE OF NAVAL RESEARCH

Contract N00014-85-K-0899

R&T Code <u>1513A:DHP</u>

Technical Report No. 5



8 19 04 5

87

Conductive Materials Based On Delocalized Carbanions

bу

Lawrence F. Hancock and Bernard Gordon III

Prepared for Publication

in the

ACS Division of Polymer Chemistry, Polymer Preprints

Penn State University Polymer Science Section Materials Science and Engineering Department University Park, PA 16802

August 1, 1987

Reproduction in whole or part is permitted for any purpose of the United States Government

This document has been approved for public release and sale; its distribution is unlimited. Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

AD-A183590 REPORT DOCUMENTATION PAGE

Secolation and Secolar

)[______

Unclassified NORE 1: SEQURITY CLASSIFICATION AUTHORITY 3: Distribution Availability OF REPORT 2: SECURITY CLASSIFICATION AUTHORITY 3: Distribution availability OF REPORT 2: DECLASSIFICATION AUTHORITY 3: Distribution unlighted 2: PERFORMING ORGANIZATION REPORT NUMBERS): 5: MONITORING ORGANIZATION UNMBERS): 3: MORE OF PROVING ORGANIZATION 6: OFFICE TYMEOL 1: The Penepsylvania State 7: ADDRESS (City, State, and ZP Code) Diversity 7: ADDRESS (City, State, and ZP Code) Diversity Park, PA 16802 7: ADDRESS (City, State, and ZP Code) OFFICE OF MAVAL RESEARCH 0WR OPFICE OF NAVAL RESEARCH 0WR 0. SOURCE OF FUNDING UNMBERS 0WORK UNIT 0. Conductive Materials Based on Delocalized Anions (unclassified) 10: SOURCE OF FUNDING UNMBERS 11: THLE (include Security Classification) 10: SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 12: DERSONAL AUTHONIS) 13: SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 14: DATE OF REPORT 14: DATE OF REPORT (very Month, Day) 15: SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 11: THE (include Secounty Classification) <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>						
20. DECLASSIFICATION /DOWNGRADING SCHEDULE Approach for public release; Distribution unlisted 4. PERFORMING ORGANIZATION REPORT NUMBER(S) Technical Report Number; 5. MONITORING ORGANIZATION NEPORT NUMBER(S) 5. MARE OF FUNCTIONING ORGANIZATION NEPORT NUMBER(S) Technical Report Number; 5. MONITORING ORGANIZATION REPORT NUMBER(S) 6. NAME OF FUNCTIONING ORGANIZATION The Pennsylvania State University Park, PA 16802 7b. ADDRESS (Cir), State, and ZP Code) 6. ADDRESS (Cir), State, and ZP Code) Diversity Park, PA 16802 9. PROCUREMENT INSTRUMENT COENTIFICATION NUMBER ORGANIZATION OFFICE OF MAVAL RESEARCH OWR 9. PROCUREMENT INSTRUMENT COENTIFICATION NUMBER PROGRAM 6. ADDRESS (Cir), State, and ZP Code) 10. SOURCE OF FUNDING NUMBERS PROGRAM WORE UNIT NO 11. ITLE (include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) 12. PERCONAL AUTHONE(S) L. P. RANCOK and B. Cordon III 12. SUPPLEMENTARY NOTATION 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 11. TITLE (include Security Classification) Conductive Materials Based on delocalized Anions (unclassified) 12. PERFORM AUTHORIS) L. P. Remock and B. Cordon III 14. Date of REPORT (rev. Month, Day) IS PAGE COUNT 8/1/87 13. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 14. Date of REPORT Symbolic Transition of organic conductors based on delocalized carabanions are presented. The symbolic of rodoins. The	1a. REPORT SECURITY CLASSIFICATION Unclassified					
A. PERFORMING ORGANIZATION REPORT NUMBER(S) Technical Report Number: 5 S. MONITORING ORGANIZATION REPORT NUMBER(S) Technical Report Number: 5 5a. NAME OF PERFORMING ORGANIZATION The Pennsylvania State Sb. OFFICE SYMBOL (If applicable) 7a. NAME OF MONITORING ORGANIZATION OFFICE OF NAVAL RESEARCH 6a. ADDRESS (CR), Size, and ZIP Code) Diversity Park, PA 16802 7a. NAME OF MONITORING ORGANIZATION (If applicable) 0. GRANIZATION ORGANIZATION Sb. OFFICE SYMBOL (If applicable) 7a. NAME OF MONITORING ORGANIZATION NEW STRUMMENT IDENTIFICATION NUMBER 0. GRANIZATION ORGANIZATION Sb. OFFICE SYMBOL (If applicable) 7b. ADDRESS (CR), Size, and ZIP Code) NUMBER 0. GRANIZATION ORGANIZATION Sb. OFFICE SYMBOL (If applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER 0. GRANIZATION ORGANIZATION Sb. OFFICE SYMBOL (If applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER 0. GRANICATION ORGANIZATION ORGANIZATION ORGANIZATION ORGANIZATION Sb. OFFICE SYMBOL (If applicable) 9. PROCURAW NOME CONTR NOME CONTR NO	2a. SECURITY CLASSIFICATION AUTHORITY					
4. PERFORMING ORGANIZATION REPORT NUMBERS) 5. MONITORING ORGANIZATION REPORT NUMBERS) 5. MANE OF PROMING ORGANIZATION 60. OFFICE SYMBOL (If applicable) 72. NAME OF MONITORING ORGANIZATION OFFICE OF RAVAL RESEARCE 5. MADERSS (Ciry, Stete, and LIP Code) 10. OFFICE SYMBOL (If applicable) 75. NAME OF MONITORING ORGANIZATION OFFICE OF RAVAL RESEARCE 5. MADERSS (Ciry, Stete, and LIP Code) 10. OFFICE SYMBOL (If applicable) 76. ADDRESS (Ciry, Stete, and LIP Code) 5. MADERSS (Ciry, Stete, and LIP Code) 85. OFFICE SYMBOL (If applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER PROCEEDER INFINCTION NUMBERS 6. ADDRESS (Ciry, Stete, and LIP Code) 85. OFFICE SYMBOL (If applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER PROCEEDER INFINCTION NUMBERS 71. ITTLE (Include Security Classification) 00. OFFICE OF RUNDING NUMBERS NOOTH IDENTIFICATION NUMBERS 72. ADDRESS (Ciry, State, and LIP Code) 110. SOURCE OF FUNDING NUMBERS NOOTH IDENTIFICATION NUMBERS 73. TO CONSTRUCT SEASONAL AUTHORS() 12. PERSONAL AUTHORS() 12. PERSONAL AUTHORS() 13. DATE OF REPORT (Year, Month, Day) 15. PAGE COUNT 74. COSATI CODES 13. DIME COVERED 14. DATE OF REPORT (Year, Month, Day) 15. PAGE COUNT 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 75. Studies on the perparation of organic conductors based on d	2b. DECLASSIFICATION / DOWNGRADING SCHEDULE		Approach for public release; Distribution unlimited			
Set. NAME OF PERFORMING ORGANIZATION The Pennsylvania State University Sto. OFFICE SYMBOL (If applicable) 7s. NAME OF MONITORING ORGANIZATION OFFICE OF NAVAL RESEARCH Set. ADDRESS (City, State, and ZIP Code) University Park, PA 16802 7b. ADDRESS (City, State, and ZIP Code) AT lington, VA 22217 Set. NAME OF FUNGING/SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable) OFFICE OF MAVAL RESEARCH 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER NOO14-85-K-0899 Set. ADDRESS (City, State, and ZIP Code) 10. SOURCE OF FUNDING NUMBERS PROCEARM NOOK UNIT ACCESSION NO 11. TITLE ORGUGE Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) NOOK UNIT ACCESSION NO 11. PITLE ORGUGE Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) NOOK UNIT B. SUPPLEMENTARY NOTATION 12. PERSONAL AUTHOR(S) L. F. Hancock and B. Cordon III Is SUPPLEMENTARY NOTATION 14. DATE OF REPORT (Year, Month, Day) 15. PAGE COUNT B/1/87 13. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 14. DATE OF REPORT PROCEARM Sub-GROUP 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 15. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 18. SUBJECT TERMS (Continue on reverse if necessary and identify by assochromatographic analysis of protonated quench products. Proliminary	4. PERFORMING ORGANIZATION REPORT NUMBER(S)					
The Pennsylvania State (# applicable) OFFICE OF NAVAL RESEARCE Duiversity Diversity Park, PA 16802 7b. ADDRESS (City, State, and ZIP Code) University Park, PA 16802 AT lington, VA 22217 Ba. NAME OF FUNDING/SPONSORING ORGANIZATION Bb. OFFICE SYMBOL (# applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER OFFICE OF NAVAL RESEARCH Bb. OFFICE SYMBOL (# applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER OFFICE OF NAVAL RESEARCH OWR Bb. OFFICE SYMBOL (# applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER OFFICE OF NAVAL RESEARCH OWR Bb. OFFICE SYMBOL (# applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER OFFICE OF NAVAL RESEARCH OWR DOUL4 -85-E-0899 WORK UNIT BC. ADDRESS (City, State, and ZIP Code) 10. SOUNCE OF FUNDION NUMBERS WORK UNIT III TITLE (Indude Security Classification) III Conductive Materials Based on Delocalized Anions (unclassified) 12. PROGRAM 112. FREMONTAL AUTHOR(S) L. F. HANCOCK and B. Cordon III III 13. SUBJECT TERMS (Continue on reverse if metessary and identify by block number) 12. Studies on the perparation of organic conductors based on delocalized Carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (%, %'- diphenylhylenyl dianion. The anions were char	Technical Report Nu	mber: ⁵				
Iniversity OFFICE OF MAYLE RESERTCE GE ADDRESS (Gry, State, and Z/P Code) University Park, PA 16802 University Park, PA 16802 ADDRESS (Gry, State, and Z/P Code) State of Function Bb. OFFICE SYMBOL (If applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER OFFICE OF NAVAL RESERACE Bb. OFFICE SYMBOL (If applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER OFFICE OF NAVAL RESERACE OWR 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER OFFICE OF NAVAL RESERACE OWR 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER OFFICE OF NAVAL RESERACE OWR 9. PROCURE OF FUNDING NUMBERS PROBAL AUTHOR(S) IS. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 12. PERSONAL AUTHOR(S) 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 15. SUPPLEMENTARY NOTATION 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ABSTRUCT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (S, G' diphenylkylenyl diation. The anions were characterized by gas chromatograph						
SE ADDRESS (Gry, State, and 2P Code) The ADDRESS (Gry, State, and 2P Code) Ba. NAME OF FUNDING /SPONSORING ORGANIZATION Bb. OFFICE SYMBOL (P applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER NOO14-85-K-0899 BE. ADDRESS (Gry, State, and 2P Code) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER PROGRAM NO BE. ADDRESS (Gry, State, and 2P Code) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER PROGRAM NO BE. ADDRESS (Gry, State, and 2P Code) 00 10. SOURCE OF FUNDING NUMBERS PROGRAM NO BE. ADDRESS (Gry, State, and 2P Code) 10. SOURCE OF FUNDING NUMBERS PROGRAM NO NO 11. NITLE (include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) NO NO NO 12. FRANCISE I.F. Hancock and B. Cordon III L. F. Hancock and B. Cordon III 14. DATE OF REPORT (rear, Month, Day) IS. PAGE COUNT 13. TYPE OF REPORT IB. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 14. SUPPLEMENTARY NOTATION 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 15. ABTIECT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of protonated quench products.		(if applicable)	OFFICE OF NAVAL RESEARCH			
University Park, PA 16802 Arlington, VA 22217 Ba. MAME OF FUNDING (SPONSORING ORGANIZATION ORGANIZATION ORGANIZATION OFFICE OF MAVAL RESEARCH ORGANIZATION OFFICE OF MAVAL RESEARCH ONR Bb. OFFICE SYMBOL (If applicable) ONR 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER NOO14-85-K-0899 Bc. ADDRESS (Gry, State, and ZIP Code) PROCURE OF FUNDING NUMBERS PROCURE OF FUNDING NUMBERS PROCURE MAVAL RESEARCH ON PROCURE MAVAL RESEARCH NOO14-85-K-0899 Bc. ADDRESS (Gry, State, and ZIP Code) ID. SOURCE PROCURE MAVERS NOO14-85-K-0899 IASK NOO14-85-K-0899 I1. TITLE (Include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) IN NO. WORK UNIT ACCESSION NO ACCESSION NO NO. 12. PERSONAL AUTHOR(S) L. F. BARCOK and B. Gordon III 13. TYPE OF REPORT FELD GROUP SUBJECT TERMS (Continue on reverse if necessary and identify by block number) IS. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 17. COSATI CODES FELD GROUP Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (a, a) d' diphenylylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indciate a conductivity of ASTRACT SECURITY CLASSIFICATION (CLASSIFICATION/AUAULABILITY OF ABSTRACT SUNCLASSIFICATION/AUAULABILITY OF ABSTRACT SECURITY CLASSIFICATION (20) COSTRUCTION/AUAULABILITY OF ABSTRACT						
Ba. NAME OF FUNDING /SPONSORING ORGANZATION Bb. OFFICE SYMBOL (If applicable) 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER BOOL4-85-E-0899 BC. ADDRESS (GIP, State, and ZIP Code) NR BOOL4-85-E-0899 BC. ADDRESS (GIP, State, and ZIP Code) NR BOOL4-85-E-0899 BC. ADDRESS (GIP, State, and ZIP Code) NR BOOL4-85-E-0899 BC. ADDRESS (GIP, State, and ZIP Code) NR NOOL4-85-E-0899 BC. ADDRESS (GIP, State, and ZIP Code) NR NOOL4-85-E-0899 BC. ADDRESS (GIP, State, and ZIP Code) NR NOOL4-85-E-0899 BC. ADDRESS (GIP, State, and ZIP Code) NO NOOK UNIT ACCESSION NC III. TITLE (Include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) NORK UNIT ACCESSION NC II2. PERSONAL AUTHOR(S) L. F. Hancock and B. Gordon III III. III. Date OF REPORT (Year, Month, Day) IS. PAGE COUNT BAIL (CONTINUE ON TRAINING COUNT BAIL (CONTINUE ON TANALABLENTY OF ABSTRACT BUNCLASSIFICATION (CASSIFICATION BAIL (CONTINUE COUNT BAIL (CONTINUE COUNT BAIL (CONTINUE COUNT BAIL (7b. ADDRESS (City, State, and ZIP Code)			
ORGANIZATION OFFICE OF NAVAL RESEARCH (if applicable) ONR NOOD14-85-E-0899 BC. ADDRESS (Cir, State, and ZIP Code) 10 SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. Task NO. WORK UNIT Ask NO. 11. TITLE (Include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) PROGRAM III. TITLE (Include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) 12. PERSONAL AUTHOR(S) L. F. Hancock and B. Gordon III 14. Date of REPORT (rear, Month, Day) 15. PAGE COUNT FROM 13. TYPE OF REPORT 13b. TIME COVERED FROM 14. Date of REPORT (rear, Month, Day) 15. PAGE COUNT 8/1/87 14. SUPPLEMENTARY NOTATION 16. SUPPLEMENTARY NOTATION 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ABITOCT (Continue on reverse if necessary and identify by block number) 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (b, c) d'-diphenylsylenyl dianion. The anions were characterized by gas chromatographic indicise a conductivity of AS_1.X10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. OISTRBUTION/AAVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. TELEPONE (Include Area Code) 22. OFFICE SYMBOL 22. TELEPONE (Include Area Code) 22. OFFICE SYMBOL 220	University Park, PA	16802	Arlin	gton, VA	22217	
OFFICE OF NAVAL RESEARCH ONR NOO014-85-K-0899 Bc. ADDRESS (City, State, and ZIP Code) ID. SOURCE OF FUNDING NUMBERS PROGRAM PROGRAM PROGRAM NO. NO. ACCESSION NC 11. TITLE (Include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) INC. NO. ACCESSION NC 12. PERSONAL AUTHOR(S) L. F. HENCOCK and B. Gordon III II. II. II. Date of REPORT (Year, Month, Day) IS. PAGE COUNT 13. TYPE OF REPORT IB. TIME COVERED FROM 14. DATE OF REPORT (Year, Month, Day) IS. PAGE COUNT 14. SUPLEMENTARY NOTATION II. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 13. ABLACT (CONTINUE on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions. The synthesis of potonated quench products. Preliminary DC conductivity measurements indicate a conductivity of S.S. x, 10 ⁻¹ 8/Cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20 DISTRIBUTION/AWAILABULTY OF ASSTRACT IDTC USERS 21. ABSTRACT SECURITY CLASSIFICATION 21 ODSTRIBUTION/AWAILABULTY OF ASSTRACT DTC USERS 21. ABSTRACT SECURITY CLA			9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER			
BC. ADDRESS (Civ, State, and ZIP Code) 10 SOURCE OF FUNDING NUMBERS PROGRAM PROJECT TASK WORK UNIT 11 TITLE (Include Security Classification) WORK UNIT ACCESSION NC Conductive Materials Based on Delocalized Anions (unclassified) 12 PROSONAL AUTHOR(S) I.F. Hancock and B. Gordon III 13. TYPE OF REPORT 13b. TIME COVERED 14. DATE OF REPORT (Year, Month, Day) 15. PAGE COUNT 16. SUPLEMENTARY NOTATION TO 14. DATE OF REPORT (Year, Month, Day) 15. PAGE COUNT 17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 13. ABUTCT (Continue on reverse if necessary and identify by block number) 19. ABUTCT (Continue on reverse if necessary and identify by block number) 14. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions. The synthesis of protonated quench products. Preliminary DC conductivity measurements indicate a conductivity of S.S. 10 ⁻¹ alg/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. OPSTRIBUTION/AVAILABULTY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 21. OPSTRIBUTION/AVAILABUL	OFFICE OF NAVAT PROPAGE		NOO014-85-K-0899			
PROGRAM PROJECT TASK WORK UNIT ELEMENT NO. NO. NO. ACCESSION NO. 11. TITLE (Include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) ACCESSION NO. 12. PERSONAL AUTHOR(S) L. F. Hancock and B. Gordon III III. 13. TYPE OF REPORT 13b. TIME COVERED 14. DATE OF REPORT (Year, Month, Day) 15. PAGE COUNT 16. SUPPLEMENTARY NOTATION TO 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ABLECT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (in , in 'diphenylxylenyl dianion. The anions were characterized by gas chromatographic anidciate a conductivity of 5.x, 10 ⁻¹ (Cosens) Peliminary DC conductivity measurements indiciate a conductivity of 5.x, 10 ⁻¹ (Cosens) 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT OTIC USERS 21. ABSTRACT SECURITY CLASSIFICATION 21. ABSTRACT SECURITY CLASSIFICATION OTIC USERS 22. TELEPHONE (Include Area Code) 22. OFFICE SYMBOL 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT Cotic USERS 22. DESTRIBUTION /		10. SOURCE OF FUNDING NUMBERS				
11. TITLE (Include Security Classification) Conductive Materials Based on Delocalized Anions (unclassified) 12. PERSONAL AUTHOR(S) L. F. Hancock and B. Gordon III 13a. TYPE OF REPORT 13b. TIME COVERED FROM			PROGRAM			WORK UNIT
Conductive Materials Based on Delocalized Anions (unclassified) 12. PERSONAL AUTHOR(S) L. F. Hancock and B. Gordon III 13a. TYPE OF REPORT 13b. TIME COVERED FROM 14. DATE OF REPORT (Vesr, Month, Day) 15. PAGE COUNT 14. DATE OF REPORT 13b. TIME COVERED FROM 14. DATE OF REPORT (Vesr, Month, Day) 15. PAGE COUNT 16. SUPPLEMENTARY NOTATION 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ABLACT (Continue on reverse if necessary and identify by block number) 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ABLACT (Continue on reverse if necessary and identify by block number) 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ABLACT (Continue on reverse if necessary and identify by block number) 19. ABLACT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (G., G. d' diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indiciate a conductivity of ASTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY			ELEMENT NO.	NO.	NO.	ACCESSION NO
Conductive Materials Based on Delocalized Anions (unclassified) 12. PERSONAL AUTHOR(S) L. F. Hancock and B. Gordon III 13a. TYPE OF REPORT 13b. TIME COVERED FROM 14. DATE OF REPORT (ver, Month, Day) 15. PAGE COUNT 14. DATE OF REPORT 13b. TIME COVERED FROM 14. DATE OF REPORT (ver, Month, Day) 15. PAGE COUNT 16. SUPPLEMENTARY NOTATION 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ASTACT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (G., G'-diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indiciate a conductivity of S.S.X.10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 210. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 220. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 220. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION	11 TITLE (Include Security Classification)	·		<u> </u>		_ _
L. F. Hancock and B. Gordon III 13a. TYPE OF REPORT 13b. TIME COVERED 14. DATE OF REPORT (Year, Month, Day) 15. PAGE COUNT 16. SUPPLEMENTARY NOTATION 16. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ABUTACT (Continue on reverse if necessary and identify by block number) 19. ABUTACT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (2), (2)-diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indicate a conductivity of S.x.10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION Unclassified 22b. TELEPHONE (Include Area Code) 22c OFFICE SYMBOL 210. DISTRIBUTION/AVAILABILITY OF ABSTRACT 22b. TELEPHONE (Include Area Code) 22c OFFICE SYMBOL 220. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 0NR 220. DISTRI	Conductive Materials Based	on Delocalized	Anions (unc	lassified)		
FROM TO 8/1/87 16. SUPPLEMENTARY NOTATION 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) FIELD GROUP SUB-GROUP 19. ABLTRCT (Continue on reverse if necessary and identify by block number) 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (2), (2) -diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indciate a conductivity of S.x.10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. OVERTIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABS	12. PERSONAL AUTHOR(S) L. F. Hancock and B. Gordor	a III				
16. SUPPLEMENTARY NOTATION 17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) 19. ABUTACT (Continue on reverse if necessary and identify by block number) 19. ABUTACT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (i), (i) - diphenylxylenyl dianion. The anions were characterized by gas chromatographic indicate a conductivity of S_x 10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 21. ADSTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 220. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 220. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 220. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 220. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABS		OVERED	14. DATE OF REPO	RT (Year, Month,	Day) 15. PAGE	COUNT
17. COSATI CODES 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) FIELD GROUP SUB-GROUP 19. ABURCT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium G., G. diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indciate a conductivity of S. x. 10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20 DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIC/UNULINITEO SAME AS RPT OTIC USERS 21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIE/UNULINITEO SAME AS RPT OTIC USERS DIGUE USERS 21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIE/UNULINITEO SAME AS RPT OTIC USERS 21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIE/UNULINITEO 21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIE/UNULINITEO 2.1 ABSTRACT SECURITY CLASSIFICATION 2.1 ABSTRACT		TO	8/1/87		L	
FIELD GROUP SUB-GROUP 19. ABUTACT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (a). (a): -diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indciate a conductivity of S. x, 10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION CJUNCLASSIFIED/UNLIMITED SAME AS RPT DTIC USERS 22a NAME OF RESPONSIBLE INDIVIDUAL DTIC USERS Unclassified DD FORM 1473, 84 MAR B3 APR edition may be used until chausted. SECURITY CLASSIFICATION OF THIS PAGE	16. SUPPLEMENTARY NOTATION		•.		•	
19. AB FRCT (Continue on reverse if necessary and identify by block number) Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (a, . (a'-diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indiciate a conductivity of 5 x 10 ⁻¹ s/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 21. ABSTRACT SECURITY CLASSIFICATION Winter the synthesis 22. NAME OF RESPONSIBLE INDIVIDUAL DITIC USERS 22.a NAME OF RESPONSIBLE INDIVIDUAL 22.b TELEPHONE (Include Area Code) 22.a NAME OF RESPONSIBLE INDIVIDUAL 23.APR edition may be used until exhausted. 23. APR Redition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE	17. COSATI CODES	Continue on reverse	e if necessary and	d identify by bloi	:k number)	
Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (2, (2)-diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indiciate a conductivity of 5 x 10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION	FIELD GROUP SUB-GROUP					
Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (2, 0) - diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indciate a conductivity of 5 x 10 ⁻¹⁸ /cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION		ł				
Studies on the perparation of organic conductors based on delocalized carbanions are presented. The synthesis of sodium and potassium diphenylmethyl anions and potassium (2, (2)-diphenylxylenyl dianion. The anions were characterized by gas chromatographic analysis of protonated quench products. Preliminary DC conductivity measurements indiciate a conductivity of 5 x 10 ⁻¹ 8/cm for sodium diphenylmethyl anion. The synthesis of polyethers containing the diphenylmethyl structural unit are described. 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION	19 APTRACT (Continue on covers if accurate	and identify by black				
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT <td< td=""><td>13. Abbreact (continue on reverse ir necessary</td><td>and identity by block r</td><td>umber)</td><td></td><td></td><td></td></td<>	13. Abbreact (continue on reverse ir necessary	and identity by block r	umber)			
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 21. ABSTRACT SECURITY CLASSIFICATION Imclassified 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 22. DISTRACT SECURITY CLASSIFI	Studies on the perperation	of organic and				
20. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. Distribution / Availability OF ABSTRACT 22. Distribution / Availability Classification 22. Distribution / Availability OF ABSTRACT 22. Office Symbol 22. Distribution / Availability OF ABSTRACT 22. Office Symb	presented. The synthesis o	of sodium and po	tassium dinh	on delocali envimettul	.zed carbani	ons are
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 22. COFFICE SYMBOL 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 22. DISTRIBUTION / AVAILABILITY CLASSIFICATION OF THIS PAGE DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE	d - d - d - d - d - d - d - d - d - d -	Inion. The anio	ns were char	actorized by	· · · · ·	*****
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 22. MAME OF RESPONSIBLE INDIVIDUAL DTIC USERS 22. NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (include Area Code) 22. OFFICE SYMBOL (202)696-4410 OD FORM 1473, 84 MAR 83 APR edition may be used until exhausted.	The analysis of proconated duen	CD products. P	reliminary D	C and a start	A	ments
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION 21. ABSTRACT SECURITY CLASSIFICATION Unclassified 22. NAME OF RESPONSIBLE INDIVIDUAL DTIC USERS 22. NAME OF RESPONSIBLE INDIVIDUAL DTIC USERS 22. NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (Include Area Code) 22. OFFICE SYMBOL ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted.	A, Indefate a conductivity of	⊃_X_1U †8/cm fo	r sodium din	henvlmathul	anion The	
JUNCLASSIFIED/UNLIMITED SAME AS RPT DTIC USERS Unclassified 22a NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (Include Area Code) 22c. OFFICE SYMBOL Dr. Kenneth J. Wynne (202)696-4410 ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE	2 of polyethers containing th	e diphenylmethy	l structural	unit are de	scribed.	-
JUNCLASSIFIED/UNLIMITED SAME AS RPT DTIC USERS Unclassified 22a NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (Include Area Code) 22c. OFFICE SYMBOL Dr. Kenneth J. Wynne (202)696-4410 ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE	,			TA I		
JUNCLASSIFIED/UNLIMITED SAME AS RPT DTIC USERS Unclassified 22a NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (Include Area Code) 22c. OFFICE SYMBOL Dr. Kenneth J. Wynne (202)696-4410 ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE		•			· · / \	
JUNCLASSIFIED/UNLIMITED SAME AS RPT DTIC USERS Unclassified 22a NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (Include Area Code) 22c. OFFICE SYMBOL Dr. Kenneth J. Wynne (202)696-4410 ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE						
JUNCLASSIFIED/UNLIMITED SAME AS RPT DTIC USERS Unclassified 22a NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (Include Area Code) 22c. OFFICE SYMBOL Dr. Kenneth J. Wynne (202)696-4410 ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE						
JUNCLASSIFIED/UNLIMITED SAME AS RPT DTIC USERS Unclassified 22a NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (Include Area Code) 22c. OFFICE SYMBOL Dr. Kenneth J. Wynne (202)696-4410 ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE						
22a NAME OF RESPONSIBLE INDIVIDUAL 22b. TELEPHONE (Include Area Code) 22c. OFFICE SYMBOL Dr. Kenneth J. Wynne (202)696-4410 ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE					ATION	
Dr. Kenneth J. Wynne (202)696-4410 ONR DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE		UPI. LIDTIC USERS				
DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE						WBOL
SECOND CONSTRUCTION OF THIS PAGE	ويستعين أكالشرج الخدير المتقال ويستألب بالتناقص والمتكر المتعالي والمتحد والمتحدين المحاد المتحد والمتحد المتح	Redition may be used un				
		All other editions are of		SECURITY	LLASSIFICATION (JE THIS PAGE

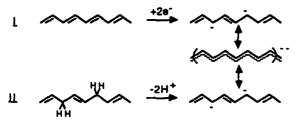
CONDUCTIVE MATERIALS BASED ON DELOCALIZED CARBANIONS

Lawrence F. Hancock, and Bernard Gordon III Polymer Science Section Materials Science and Engineering Department Penn State University Park, PA 16802

INTRODUCTION

Organic materials which possess metal-like conductivity have long been of interest to chemists. Since 1977, when it was demonstrated that polyacetylene on treatment with a variety of electron donors or acceptors could be transformed from a semiconductor to a metal-like conductor¹, interest in polymeric conductors has flourished. Within this deluge a plethora of other polymers have been shown to be capable of metal-like conductivity upon similar treatment.

Chemically, the transformation of a semiconductive, fully conjugated polymer (such as polyacetylene) to a metal-like conductor is believed to be a simple electronic oxidation or reduction reaction.² The reductive process is shown schematically in Reaction I for polyacetylene and an electron donor as the dopant. The resulting electrically conductive material is apparently based on an extended delocalized carbanionic structural unit. Our research is based on an alternative chemistry to an equivalent delocalized carbanionic structure, as shown in reaction II.

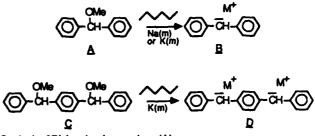


Proton abstraction from relatively acidic doubly allylic and/or benzylic methylene units is facile. The utility of strong base chemistry for the preparation of electrically conductive materials was first demonstrated through the synthesis of poly(p-phenylene pentadienylene) and its "doping" with n-BuLi.³ Tolbert et al. have also demonstrated proton abstraction doping for the preparation of doped polyacetylene.⁴

In this work we would like to present further studies on the utility of proton abstraction doping for the preparation of organic conductors, concentrating on the synthesis and properties of low molecular weight conductive anions.

EXPERIMENTAL

Synthetic schemes for the preparation of delocalized anions used in this study are outlined below.



Synthesis of Diphenylmethoxymethane (A)

Diphenylmethoxymethane was prepared through a facile two step procedure. First benzophenone was reduced with NaBH4 to benzhyrdrol. Methylation was accomplished with a Williamson reaction using DMSO as the solvent, KOH as the base and Mel.⁵ (Characterization of Δ_i bp 117-119°C @2mmHg, ¹H NMR ∂ 7.2, 10H; ∂ 5.1, 1H; and ∂ 3.2, 3H)

Synthesis of K/Na Diphenylmethyl Anion (B)

Diphenylmethoxymethane was dissolved in hexane (0.2M); to this mixture a minimum of 5eq of the appropriate metal was added. The reaction was then stirred under an inert atmosphere for 2-4 days. The anions were formed as a fine suspension in the inert solvent. These were isolated via centrifugation and subsequently washed at least 2X with hexane. The anions were then dried to a fine powder on a high vacuum line.

Synthesis of $\alpha_{,\alpha}$ '-diphenyl- $\alpha_{,\alpha}$ '-dimethoxy-p-xylene (C)

Compound <u>C</u> was prepared in a two-step reaction procedure. Initially, 2.2 equivalents of phenyl lithium was added to a THF solution of terephthalaldehyde. The bis alkoxide formed by addition to the carbonyl moieties was then methylated in situ with dimethylsulfate to form compound <u>C</u> (mp 78-80°C; ¹H NMR ∂7.3, 14H; ∂5.15, 2H; and ∂3.3, 6H).

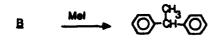
Synthesis of K α, α' -diphenyl-p-xylenyl dianion (D)

Compound <u>D</u> was prepared directly by the ether cleavage reaction shown above. In excess of 5 equivalents of potassium metal was added to a 0.01M solution of <u>C</u> in dry cyclohexane. The mixture was stirred at RT for 2 days at which time the potassium dianion was isolated and washed with fresh cyclohexane through successive centrifugation and decantation.

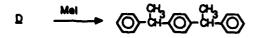
DISCUSSION

The aim of these studies is to lay the groundwork for the development of polymeric conductors based on delocalized anions. Preparation of chemically pure anions and characterization of their electrical properties are pivotal to the development of such a material. The ether cleavage reaction, described in the experimental, provides a convenient route for the preparation of chemically pure delocalized anions. Isolation of the anions is facilitated by precipitation from the hydrocarbon solvent; which are then easily dried under vacuum to a fine powder.

Chemical purity of the anions was determined by both their reactivity (methylation with Mel) and through direct analysis of the quenched anion using capillary gas chromatography. Methylation of both the Na and K diphenylmethyl anions provided 1,1-diphenylethane.



Similarly, methylation of K α, α' -diphenylxylenyl dianion yielded α, α' -diphenyl- α, α' -dimethylxylene.

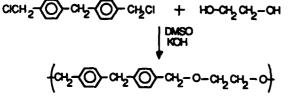


Capillary GC analysis was performed on quenched samples of the Na and K diphenylmethyl anions. Samples of the anions were dissolved in-THF, quenched with t-BuOH, then neutralized. The samples were analysed on a Hewlett-Packard 5880 capillary gas chromatograph using a 12 meter methyl silicone column. No peaks were detected other than the expected signals for the solvents (tBuOH and THF) and diphenylmethane.

Initial studies on the electrical properties of the anions have been made by 2pt and 4pt DC conductivity measurements. Measurements have been performed using a Kiethly 617 electrometer, Kiethly 124 current source and a Kiethly 197 multimeter. In most cases measurements have been performed on pre-pressed pellets of the anions (samples were routinely pressed for 10-20mins at 10,000 Kg/m² in a stainless steel KBr pellet press).

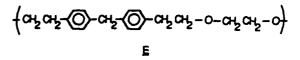
Results obtained for the Na diphenylmethyl anion tested in a linear 4pt geometry showed a conducitivity of $5x10^{-1}$ S/cm. However, at this point the affect of a minute amount of residual Na metal has not been discerned. The K diphenylmethyl anion exhibited a more complex behavior. Prepressed pellets of the anion were very resistiv($<S\Omega$). However under a pressure of 2,000Kg/m² resistivities as low as 10-15KΩ have been noted. A more detailed evaluation of this behavior is being undertaken.

Preparation of polymer supported delocalized anions is proceeding concurrently with our studies of isolated anions. A Williamson ether condensation polymerization has been utilized for the preparation of a polyether possessing a diphenylmethyl structural unit (shown below).



NG GOOD CONTRACT

Structural confirmation of the polyether was obtained from ¹H NMR. Gel permeation chromatography of the material indicated a polystyrene equivalent molecular weight of 2000emu. Treatment of a THF solution of the above polyether with a-BuLi yielded a deep blue solution, apparently indicating anion formation. However, the color began to dissipate within Smins, presumably due to cleavage of the labile benzyl ether linkage. Our current synthetic target is compound <u>E</u>, which should eliminate this concern.



ACKNOWLEDGEMENT

The authors wish to thank the Office of Naval Research for their generous support of this project.

REFERENCES

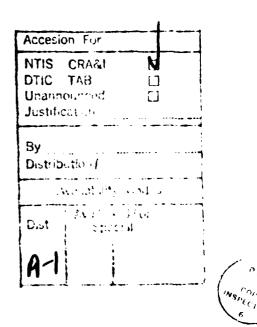
1) H. Shirakawa, E.J. Louis, A. G. MacDiarmid and A. J. Heeger, J. Chem. Soc., Chem. Commun., 1977, 578.

2) J. L. Bredas, R. R. Chance and R. Sibley, Phys. Rev. B, 1982, 26, 5843.

3) L. F. Hancock, B. Hilker, W. Chapman and B. Gordon III, *Polymer Preprints*, 1986, 27(1), 359; L. F. Hancock and B. Gordon III, *Polymer* (in press).

4) L. M. Tolbert and J. A. Schomaker, Polymer Preprints, 1986, 27(2), 197.

5) R. A. W. Johnstone and M. E. Rose, Tetrahedron, 1979, 35, 2169.



- Walks

