

## **Richard D. McCullough**

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### **ACADEMIC APPOINTMENTS**

- 2012-Present: Vice Provost for Research, Harvard University
- 2013-Present: Professor of Materials Science and Engineering, Harvard University
- 2007-2012: Vice President for Research, Carnegie Mellon University
- 2001-2007: Dean, Mellon College of Science, Carnegie Mellon University
- 1998-2001: Head of Chemistry, Carnegie Mellon University
- 2009-2012: Thomas Lord Professor of Chemistry, Carnegie Mellon University
- 1998-2009: Professor of Chemistry, Carnegie Mellon University
- 1996: Visiting Professor, University of Copenhagen
- 1995-1998: Associate Professor of Chemistry, Carnegie Mellon University
- 1990-1995: Assistant Professor of Chemistry, Carnegie Mellon University

### **BOARD AND LEADERSHIP POSITIONS**

- 2020-2021: Managing Director, Center for Advanced Biological Innovation and Manufacturing, a Public Benefit Corporation
- 2020: Research Continuity External Review Committee, Stanford University
- 2018-Present: Scientific Advisory Board, Villum Foundation, Denmark
- 2018-Present: Massachusetts Life Sciences Strategy Board
- 2018-Present: Chairman of the Board of Directors, National Science and Engineering Council of Canada, Green Electronics Network
- 2018-Present: Board of Directors, Higgins Trust
- 2013-Present: Executive Committee, The Broad Institute, Stanley Center for Psychiatric Research
- 2012-Present: Scientific Advisory Board, Massachusetts General Hospital

2012-Present: Board of Directors, Wyss Institute for Bio-inspired Engineering, Harvard University

2012-Present: Collaborative Coordination Board, Broad Institute

2012-Present: Board of Directors, Ragon Institute

2012-Present: Executive Advisory Board, CATALYST, Center for Science and Translational Medicine, Harvard Medical School

2012-Present: Board of Directors, Harvard Global

2010-Present: Board of Directors (Executive Chairman) and Founder Liquid X Printed Metals

2012-2019: Board of Directors, Brookhaven National Lab

2017: Princeton University Provost's Advisory Board on Research and Innovation

2016: Washington University at St. Louis Advisory Board on Technology Transfer and Innovation, Chair

2002-2014: Board of Directors, Chief Scientist Officer, and Founder Plextronics, Inc.

2013: Oxford University Innovation Working Group an Advisory Board on Knowledge Exchange, Technology Transfer, and Innovation

2013: Georgia Institute of Technology Polymer Network Advisory Board

2011-2012: Board of Directors, Department of Energy Innovation Hub on Sustainable Buildings

2009-2012: Board of Directors, Pittsburgh Tissue Engineering Institute

2008-2012: Board of Directors, Innovation Works

2008-2012: Board of Directors, Pittsburgh Life Sciences Greenhouse

2001-2012: Board of Directors, Mellon Pittsburgh Corporation

2008: Advisory Board, Nanoscience Center, University of Central Florida

2004-2006: University of Washington Nanotechnology Center Advisory Board

1999-2000: Scientific Advisory Board, BF Goodrich Performance Materials

## EDITORIAL BOARDS

- 1998-Present: Editorial Board, *Advanced Materials*
- 2015-Present: International Editorial Board, *Advanced Electronic Materials*
- 2015-Present: Editorial Board, *EC Chemistry Journal*
- 2010-Present: Editorial Board, *Organic Chemistry: Current Research*
- 1994-2000: International Advisory Board, *Journal of Materials Chemistry*

## EDUCATION

- 1988-1990 Postdoctoral Fellow, Columbia University, New York, NY  
Research Advisor: Professor Ronald Breslow
- 1982-1988 Ph.D., Organic Chemistry, The Johns Hopkins University, Baltimore, MD  
Research Advisor: Professor Dwaine O. Cowan
- 1979-1982 B.S., Chemistry, The University of Texas at Dallas
- 1977-1979 Eastfield Community College

## HARVARD UNIVERSITY LEADERSHIP COMMITTEES

- 2020-Present: Climate Change Planning Committee-Chair
- 2020-Present: Harvard University and Hospitals Lab Reopening Committee-Chair
- 2020-Present: Research Compliance and Policy Committee-Chair
- 2020-Present: Harvard University COVID-19 Task Force
- 2019-Present: Center for Advanced Biological Innovation and Manufacturing
- 2019-Present: Harvard Corporation's Honorary Degree Committee
- 2018-Present: Oversight of Sensitive Collaboration and Research Programs, Co-Chair
- 2018-Present: Provost Council
- 2015-Present: Harvard i-Lab Life Lab Start-up Selection Committee
- 2014-Present: Allston Campus Academic Planning Committee
- 2012-Present: Gift Policy Committee
- 2012-Present: Oversight of New Educational and Research Programs, Chair
- 2012-Present: University Risk Management Committee
- 2012-Present: Information Security Oversight Committee
- 2014-2016: Enterprise Research Campus Committee, Co-Chair

## GOVERNMENT LEADERSHIP COMMITTEES

- 2018-Present: National Academy of Science Roundtable Committee on Open Science
- 2019: White House Summit on America's Bio-economy
- 2018: White House Summit on America's Future in Quantum Computing
- 2017-2018: AAU Committee on Technology Transfer and Intellectual Property Assets
- 2008-2011: Co-Chair, Department of Commerce-Emerging Technology and Research Advisory Committee on Export and Deemed Export Control

## PRINCIPAL RESEARCH INTERESTS

Printable electronic materials, including the discovery and development of regioregular polythiophenes and commercial, reactive metal inks. Regioregular polythiophene has been among the most highly studied materials in the past two decades.

## HONORS

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|------|---|
| 2021 | Hall of Fame, <i>Advanced Materials</i> for groundbreaking research discoveries           |
| 2013 | National Academy of Inventors, Elected Fellow   |
| 2007 | American Chemical Society Pittsburgh Award  |
| 2006 | Start-Up Entrepreneur of the Year Award<br>Carnegie Science Center's Awards of Excellence |
| 2005 | Alumni Achievement Award, University of Texas, Dallas                                     |
| 2002 | American Chemical Society Akron Award   |
| 1992 | AT&T Special Foundation Award   |
| 1987 | Sarah and Adolph Roseman Achievement Award in Research and Teaching                       |

## PLENARY LECTURES

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| 2019 | Plenary Lecturer, Academic Year Opening, Tilburg University  |
| 2012 | Plenary Lecturer, 75 <sup>th</sup> year celebration of the<br>Danish Academy of Technical Sciences |
| 2012 | Keynote Lecturer Solvay Conference   |
| 2011 | Plenary Lecturer University Technology Entrepreneurial Network,<br>Portugal                        |
| 2010 | Plenary Lecturer Indian National Energy Conference, IIT Kanpur                                     |
| 2010 | Xerox Keynote Lecturer Canadian High Polymer Conference  |
| 2003 | Murtiashaw Lecturer, University of South Carolina  |
| 2000 | National Starch Keynote Nanotechnology Lecturer  |
| 1999 | Bayer Keynote Lecturer, Bayer Polymer Symposium  |

## SCIENTIFIC ACTIVITIES

185 Invited Lectures. 195 Publications (includes conference proceedings-not listed).

### PUBLICATIONS

Google Scholar H index 54, i10 index 78, 16,460 citations

1. "An Approach to the Synthesis of TMTTeF," Cowan, D. O.; Lerstrup, K.; Veciana, J.; Rovira, C.; Bailey, A.; McCullough, R. *Mol. Cryst. Liq. Cryst.* **1985**, *102*, 285-294.
2. "Tellurium Containing Organic Metals," Cowan, D. O.; Mays, M.; Lee, M.; McCullough, R.; Bailey, A.; Lerstrup, K.; Wiygul, F.; Kistenmacher, T.; Poehler, T.; Chiang, L.-Y. *Mol. Cryst. Liq. Cryst.* **1985**, *125*, 191-204.
3. "A Convenient Synthesis of Hexamethylenetetraselenafulvalene (HMTSF)," McCullough, R. D.; Cowan, D. O. *J. Org. Chem.* **1985**, *50*, 4644-4648.
4. "The Synthesis and Study of New Selenium and Tellurium Heterocyclic  $\pi$ -Donors," Lerstrup, K.; Bailey, A.; McCullough, R. D.; Mays, M.; Cowan, D. O. *Synth. Met.* **1986**, *19*, 647-652.
5. "Tetratellurafulvalene (TTeF)," McCullough, R. D.; Kok, G. B.; Lerstrup, K. L.; Cowan, D. O. *J. Am. Chem. Soc.* **1987**, *109*, 4115-4116.
6. "Initial Study of the New Tellurium Containing Charge Transfer Organic Metal: Tetratellurafulvalene-Tetracyanoquinodimethane (TTeF-TCNQ)," Mays, M. D.; McCullough, R. D.; Cowan, D. O.; Poehler, T. O.; Bryden, W. A.; Kistenmacher, T. J. *Solid State Commun.* **1988**, *65*, 1089-1092.
7. "An Improved Synthesis of Tetratellurafulvalene via 1,2-Bis(trimethylstannylethylene)," McCullough, R. D.; Bailey, A. B.; Mays, M. D.; Cowan, D. O. *Synth. Met.* **1989**, *27*, 487-492.
8. "New Organic p-Donors: Analogues of HMTSF and HMTTeF," Bailey, A. B.; McCullough, R. D.; Mays, M. D.; Cowan, D. O.; Lerstrup, K. A. *Synth. Met.* **1989**, *27*, 425-430.
9. "Electrical and Magnetic Studies on Some New Organic Conductors Made With Tetratellurafulvalene (TTeF)," Mays, M. D.; McCullough, R. D.; Bailey, A. B.; Cowan, D. O.; Poehler, T. O.; Kistenmacher, T. J. *Synth. Met.* **1989**, *27*, 493-498.
10. "Substrate Selectivity in Epoxidation by Metalloporphyrin and Metallo salen Catalysts Carrying Binding Groups," Breslow, R.; Brown, A. B.; McCullough, R. D.; White, P. W. *J. Am. Chem. Soc.* **1989**, *111*, 4517-4518.
11. "Organic Metals Containing Tellurium," Cowan, D. O.; McCullough, R. D.; Bailey, A.; Lerstrup, K.; Talham, D.; Herr, D.; Mays, M. *Phosphorus, Sulfur, Silicon, Relat. Elem.* **1992**, *67*, 277-294.
12. "Enhanced Electrical Conductivity in Regioselectively Synthesized Poly(3-alkylthiophenes)," McCullough, R. D.; Lowe, R. D. *J. Chem. Soc., Chem. Commun.* **1992**, 70-72.
13. "Design, Synthesis, and Control of Conducting Polymer Architectures: Structurally Homogeneous Poly(3-alkylthiophenes)," McCullough, R. D.; Lowe, R. D.; Jayaraman, M.; Anderson, D. L. *J. Org. Chem.*, **1993**, *58*, 904-912.
14. "Design and Control of Conducting Polymer Architectures: Synthesis and Properties of Regiochemically Well-Defined Poly(3-alkylthiophenes)," McCullough, R. D.; Lowe, R. D.; Tristram-Nagle, S.; Jayaraman, M.; Anderson, D. L.; Ewbank, P. C. *Synth. Met.*, **1993**, *55*, 1198-1203.
15. "Novel Coordination Complexes of Tetrathiafulvalene Derivatives," McCullough, R. D.; Seth, J.; Belot, J. A.; Majetich, S. A.; Carter, A. C. *Synth. Met.*, **1993**, *56*, 1989-1994.
16. "Connected Cadmium Selenide Nanocrystallites" Majetich, S. A.; Carter, A. C.; McCullough, R. D. in *"Nanophase and Nanocomposite Materials"*, eds. S. Komarneni, J.C. Parker, and G.J. Thomas, Materials Research Society, Pittsburgh, PA **1993**, *286*, 86-92.

17. "Self-Oriented Poly(3-Alkylthiophenes): New Insights on Structure-Property Relationships in Conducting Polymers," McCullough, R. D.; Tristram-Nagle, S.; Williams, S. P.; Lowe, R. D.; Jayaraman, M. *J. Am. Chem. Soc.* **1993**, *115*, 4910-4911.
18. "Selective Generation, Isolation, and Purification of Tetrathiafulvalene Tetrathiolate: A Versatile Building Block for New Materials," McCullough, R. D.; Belot, J. A.; Seth, J. *J. Org. Chem.* **1993**, *58*, 6480-6482.
19. "Toward Tuning Electrical and Optical Properties in Conjugated Polymers Using Side-Chains: The Synthesis and Physical Properties of a Series of the First Head-to-Tail Heteratom Functionalized Polythiophenes," McCullough, R. D.; Williams, S. P. *J. Am. Chem. Soc.* **1993**, *115*, 11608-11609.
20. "Cadmium Selenide Nanocrystallite Networks", Majetich, S. A.; Seth, J.; McCullough, R. D.; Belot, J. A. *Z. Physik D* **1993**, *26*, 210-212.
21. "Synthesis and Physical Properties of Self-Orienting, Head-To-Tail Polythiophenes," McCullough, R. D.; Williams, S. P.; Jayaraman, M.; Reddinger, J.; Miller, L.; Tristram-Nagle, S. in "Electrical, Optical, and Magnetic Properties of Organic Solid State Materials," Dalton, L.; Lee, C., eds., Materials Research Society, Pittsburgh, PA **1994**, *328*, 215-220.
22. "Toward New Magnetic, Electronic, and Optical Materials: Synthesis and Characterization of New Bimetallic Tetrathiafulvalene Tetrathiolate Building Blocks," McCullough, R. D.; Belot, J. A. *Chem. Mater.* **1994**, *6*, 1396-1403. **INVITED.** Invited manuscript for the Special Issue on Solid State Organic Chemistry dedicated to the late Margaret (Peggy) Etter.
23. "<sup>1</sup>H NMR Characterization of the CdSe Nanocrystallite Surface," Majetich, S. A.; Carter, A. C.; Belot, J. A.; McCullough, R. D. *J. Phys. Chem.*, **1994**, *98*, 13705-13710.
24. "The Tuning of Conjugation by Recipe: The Synthesis and Properties of Random Head-to-Tail Poly(3-alkylthiophene) Copolymers," McCullough, R. D.; Jayaraman, M. *J. Chem. Soc., Chem. Commun.*, **1995**, 135-138.
25. "The First Synthesis and New Properties of Regioregular, Head-To-Tail Coupled Polythiophenes." McCullough, R. D.; Williams, S. P.; Tristram-Nagle, S.; Jayaraman, M.; Ewbank, P. C.; Miller, L. *Synt. Met.*, **1995**, *69*, 279-282.
26. "New Bimetallic Tetrathiafulvalene Building Blocks and Self-Assembled, Two Dimensional Conductors Derived From Regioregular, Head-to-Tail Coupled Polythiophenes" McCullough, R. D.; Belot, J. A.; Williams, S. P. in "Molecular Engineering of Advanced Materials", Becher, J., Schaumburg, K. Eds., NATO Advanced Research Workshop Series, Series C: Mathematical and Physical Sciences, **1995**, *456*, 349-363.
27. "Building Block Ligands For New Molecular Conductors: Homobimetallic Tetrathiafulvalene Tetrathiolates and Metal Diselenolenes and Ditellurolenes," McCullough, R. D.; Belot, J. A.; Seth, J.; Rheingold, A. L.; Yap, G. P. A.; Cowan, D. O. *J. Mater. Chem.*, **1995**, *5*, 1581-1587. Invited manuscript for Special Issue on Molecular Conductors.
28. "Toward New Electronic, Magnetic, and Optical Materials: Structure and Properties of the First Homobimetallic Tetrathiafulvalene Tetrathiolate Building Block," McCullough, R. D.; Belot, J. A.; Rheingold, A. L.; Yap, G. *J. Am. Chem. Soc.*, **1995**, *117*, 9913-9914.
29. "Dramatic Conjugational Interchange in Regiochemically Pure Polythiophenes Via a Chemoselective Recognition Response," McCullough, R. D.; Williams, S. P. *Chem. Mater.* **1995**, *7*, 2001-2003.
30. "Intermolecular Association and Supramolecular Organization in Dilute Solution. 1. Regioregular Poly(3-dodecylthiophene)," Yue, S.; Berry, G. C.; McCullough, R. D. *Macromolecules*, **1996**, *29*, 933-939.
31. "Evidence of a Novel Side Chain Structure in Regioregular Poly(3-Alkylthiophenes)," Prosa, T. J.; Winokur, M. J.; McCullough, R. D. *Macromolecules*, **1996**, *29*, 3654-3657.
32. "Optimizing the Synthesis of Tetratellurafulvalene (TTeF)," Herr, D. E.; Mays, M. D.; McCullough, R. D.; Bailey, A. B.; Cowan, D. O. *J. Org. Chem.*, **1996**, *61*, 7006-7011.

33. "Quadratic Electro-optical Measurements of Polythiophene Films by a Modified Mach-Zehnder Interferometer," Jakobsen, C.; Petersen, J. C.; Geisler, T.; Bjornholm, T.; Greve, D. R.; McCullough, R. D. *J. Opt. Soc. Am.* **1996**, *115*, 235-240.
34. "Improved Electroluminescent In Poly(3-alkylthiophenes) With High Head-to-Tail Ratios," Mehta, P.; McCullough, R. D. *J. Mater. Chem.* **1996**, *6*, 1763-1766.
35. "Third-Harmonic Generation From Regioregular and Regioirregular Poly(3-dodecylthiophenes). Dependence of  $c^3$  on Conjugation Length," Bjornholm, T.; Greve, D. R.; Geisler, T.; Petersen, J. C.; Jayaraman, M.; McCullough, R. D. *Adv. Mater.* **1996**, *8*, 920-923.
36. "A Facile and Efficient Synthesis of Vanadocenes With Alkyl Annulated Cyclopentadienyl Rings," McCullough, R. D.; Belot, J. A. *Organometallics* **1996**, *15*, 5062-5065.
37. "Self-Assembly and Disassembly of Regioregular, Water Soluble Polythiophenes: Chemoselective Ionchromatic Sensing in Water," McCullough, R. D.; Ewbank, P. C.; Loewe, R. S. *J. Am. Chem. Soc.* **1997**, *119*, 631-632.
38. "Self-assembly and Chemical Response of Conducting Polymer Superstructures," McCullough, R. D.; Ewbank, P. C. *Synth. Met.* **1997**, *84*, 311-312.
39. "Self-Assembly in Regioregular Polythiophenes," McCullough, R. D. *Annu. Tech. Conf.-Soc. Plast. Eng.*, **1997**, *56*, 102-105.
40. "Saturation effects in the Nonlinear Optical Response of Regioregular, Highly Conjugated Poly(3-alkylthiophene) Thin Films," *Synth. Met.* **1997**, *84*, 531-532.
41. Bjørnholm, T.; Greve, D. R.; McCullough, R. D. In *Supramolecular Engineering of Synthetic Metallic Materials: Conductors and Magnets*; Veciana, J., Rovira, C., Amabilino, D. B., Eds.; NATO ASI Series C, Volume 518, Kluwer: Dordrecht, **1998**; pp 477-483.
42. "Regioregular, Head-to-Tail Coupled Poly(3-alkylthiophene) and its Derivatives," McCullough, R. D.; Ewbank, P. C. in the *Handbook of Conducting Polymers*, 2nd edition, Marcell Dekker, **1998**, Chapter 9. 225-258. **INVITED**
43. "The Chemistry of Conducting Polythiophenes," McCullough, R. D. *Adv. Mater.* **1998**, *10*, 1-24 (review). **INVITED**
44. "Structured Amphiphilic Regioregular Polythiophene Nanosheet Conductors: 2-D Self-Assembly of Highly Conjugated Polymers," Thomas Bjornholm, Daniel R. Greve, Niels Reitzel, Kristian Kjær, Paul Howes, Mani Jayaraman, Paul C. Ewbank, Richard D. McCullough *J. Am. Chem. Soc.* **1998**, *120*, 7643-7644.
45. Greve, D. R.; Reitzel, N.; Hassenkam, T.; Bøgelund, J.; Kjaer, K.; Howes, P. B.; Larsen, N. B.; Jayaraman, M.; McCullough, R. D.; Bjørnholm, T. "Directed self-assembly of amphiphilic regioregular polythiophenes on the nanometer scale." *Synth. Met.* **1999**, *102*, 1502-1505.
46. "The Chemistry of Polythiophenes: From Synthesis to Self-Assembly to Intelligent Materials," McCullough, R. D. *Handbook of Oligothiophenes and Polythiophenes*, **1999**, 1-44.
47. "A Very Simple Method to Prepare Head-to-Tail Coupled, Regioregular Poly(3-alkylthiophenes) Using Grignard Metathesis," Loewe, R. S.; Khersonsky, S. M.; McCullough, R. D. *Adv. Mater.* **1999**, *11*, 250-253.
48. "Investigating the Synthesis of Unsymmetrical Tetrathiafulvalene Derivatives: Improved Yields by the Hidden Equivalent Method," McCullough, R. D.; Petruska, M. A.; Belot, J. A. *Tetrahedron*, **1999**, *115*, 2231-2238.
49. "Employing MALDI-MS on Polyalkylthiophenes: Analysis of Molecular Weights, Molecular Weight Distributions, End Group Structures, and End Group Modifications," Liu, J.; Loewe, R. S.; McCullough, R. D. *Macromolecules* **1999**, *32*, 5777-5785.
50. "Polythiophene Nanowires," Bjørnholm, T.; Hassenkam, T.; Greve, D. R.; McCullough, R. D.; Jayaraman, M.; Savoy, S. M.; Jones, C. E.; McDevitt, J. T. *Adv. Mater.* **1999**, *11*, 1218-1221 (**paper featured on the cover**).
51. "Self-Assembly of Conjugated Polymers at the Air/Water Interface. Structure and Properties of Langmuir-Blodgett Films of Amphiphilic Polythiophenes," Reitzel, N.; Greve, D. R.; Kjaer, K.;

- Howes, P. B.; Jayaraman, M.; Savoy, S.; McCullough, R. D.; McDevitt, J. T.; Bjornholm, T. B. *J. Am. Chem. Soc.*, **2000**, *122*, 5788-5800.
52. "Regioselective Synthesis and Analysis of Polythienylvinylene," Loewe, R. L.; McCullough, R. D. *Chem. Mater.* **2000**, *12*, 3214-3221.
53. "Water Soluble Amine Functionalized Polythiophenes Bind DNA," Ewbank, P. C.; Nuding, G.; Suenaga, H.; McCullough, R. D.; Shinkai, S. *Tetrahedron Lett.* **2000**, *42*, 155-157.
54. "Regioregular, Head-to-Tail Coupled Poly(3-alkylthiophenes) Made Easy by the GRIM Method: Investigation of the Reaction and Why It Works," Loewe, R. S.; Ewbank, P. C.; Liu, J.; Zhai, L.; McCullough, R. D. *Macromolecules* **2001**, *34*, 4324-4333.
55. "Temperature and Voltage Dependent Optical Properties of Conducting Polymer in Synthetic Opal as Photonic Crystal", Satoh, S.; Kajii, H.; Kawagishi, Y.; Tamura, T.; Fujii, A.; Ozaki, M.; McCullough, R. D.; Yoshino, K., *Synth. Met.* **2001**, *121*, 1503-1504.
57. "Self-assembly of amphiphilic conducting polymers into nanowires, nanocircuits, and multifunctional materials", McCullough, R.D.; Liu, Jinsong; Sheina, Elena; Heuze, Karine; Stokes, Kristoffer; Jayaraman, Manikandan; Bjornholm, Thomas; McDevitt, John T., *Poly. Mater. Sci.*, **2001**, *84*, 858.
58. "Self-Assembly of Electrically Conductive Polymer Nanostructures: Synthesis and Properties of Well-Defined Regioregular Polythiophene Diblock and Triblock Copolymers," Liu, J.; Sheina, E.; Kowalewski, T.; McCullough, R. D. *Angew. Chem. Int. Ed. Engl.* **2002**, *41*, 329-332.
59. "Layer-by-Layer Electrostatic Self-Assembly of Polythiophene," Zhai, L. and R.D. McCullough, *Adv. Mater.* **2002**, *14*, 901-905.
60. "Synthesis and Characterization of Poly(methylacrylate) Grafted from Poly(thiophene) to Form Solid State Fluorescent Materials," Constanzo, P. J.; Stokes, K. K.; (McCullough, R. D.) *Macromolecules*, **2002**, *35*, 6804-6810.
61. "End-Group-Modification of Regioregular Polythiophene Through Post-Polymerization Functionalization," Liu, J.; McCullough, R. D., *Macromolecules*, **2002**, *35*, 9882-9889.
62. "Tuning the Electrical Conductivity and Self-Assembly of Regioregular Polythiophene by Block Copolymerization: Nanowire Morphologies in New Di- and Triblock Copolymers," Liu, J., Sheina, E., Kowalewski, T., and R.D. McCullough, *Angew. Chem. Int. Ed.*, **2002**, *41*, 329-332.
63. "Complex nanostructured materials from segmented copolymers prepared by ATRP" Kowalewski, T., McCullough, R.D., and K. Matyjaszewski *Eur. Phys. J. E*, **2003**, *10*, 5-16.
64. "A Simple Method to Generate Side-chain Derivatives of Regioregular Polythiophene via the GRIM Metathesis and Post-polymerization Functionalization" Zhai, L., Pilston, R.L., Zaiger, K.L., Stokes, K. and R.D. McCullough, *Macromolecules*, **2003**, *36*, 61-64.
65. "Soft-lithography Patterning of Functionalized Regioregular Polythiophenes" Zhai, L., Laird, D.W., and R.D. McCullough *Langmuir*, **2003**, *19*, 6492-6497.
66. "New Phosphonic Acid Functionalized, Regioregular Polythiophenes," Stokes, K. K.; Heuzé, K.; McCullough, R. D., *Macromolecules*, **2003**, *36*, 7114-7118.
67. "Regioregular Polythiophene/Gold Nanoparticle Hybrid Materials" Zhai, L., and McCullough, R.D., *J. Mater. Chem.*, **2004**, *14*, 141-143.
68. "In-situ End Group Functionalization of Regioregular Poly(3-alkylthiophene) using the Grignard Metathesis Polymerization Method," Jeffries-EL, M.; Sauvé, G., and McCullough, R. D. *Adv. Mater.*, **2004**, *16*, No. 12., 1017-1019.
69. "Chain Growth Mechanism for Regioregular Nickel-Initiated Cross-Coupling Polymerizations," Sheina, E. E.; Liu, J.; Iovu, M. C.; Laird, D. W.; McCullough, R. D. *Macromolecules*, **2004**, *37*, pg. 3526-3528.
70. "Regioregular Poly(thiophene-3-alkanoic acid)s: Water Soluble Conducting Polymers Suitable for Chromatic Chemosensing in Solution and Solid State", Ewbank, P. C.; Loewe, R. S.; Zhai, L.; Reddinger, J.; Sauvé, G.; McCullough, R. D., *Tetrahedron*, **2004**, *60*, pg. 11269-11275.
- (invited)



71. "Regioregular Poly(3-Alkylthiophene) Conducting Block Copolymers" Iovu, M. C.; Jeffries-EL, M.; Sheina, E. E.; Cooper, J. R.; McCullough, R. D.; *Polymer*, **2005**, *46*, 8582-8586.
72. "Highly Conductive, Regioregular Alkoxy-Functionalized Polythiophenes: A New Class of Stable, Low Band Gap Materials", Sheina, E. E.; Khersonsky, S. M.; Jones, E. G.; McCullough, R. D. *Chem. Mater.*, **2005**, *17*, 3317-3319.
73. "Experimental Evidence for the Quasi-"Living" Nature of the Grignard Metathesis Method for the Synthesis of Regioregular Poly(3-alkylthiophenes)", Iovu, M. C.; Sheina, E. E.; Gil, R. R.; McCullough, R. D.; *Macromolecules*, **2005**, *38*, 8649-8656.
74. "Facile Synthesis of End-Functionalized Regioregular Poly(3-alkylthiophene)s via Modified Grignard Metathesis Reaction," Jeffries-EL, Malika; Sauvé, G.; McCullough, R. D. *Macromolecules* **2005**, *38*, 10346-10352.
75. "Nanostructure Dependence of Field-Effect Mobility in Regioregular Poly(3-hexylthiophene) Thin Film Field Effect Transistors," Zhang, R.; Li, B.; Jeffries-EL, M.; Iovu, M. C.; Sauvé, G.; Cooper, J.; Jia, S.; Tristram-Nagle, S.; Smilgies, D. M.; Lambeth, D. N.; McCullough, R. D.; Kowalewski, T. *J. Am. Chem. Soc.* **2005**, *128*, 3480-3481.
76. "Conducting Block Copolymer Nanowires Containing Regioregular Poly(3-hexylthiophene) and Polystyrene," *J. Macromolecular Science Part A: Pure and Applied Chemistry* **2006**, *43*, 1991-2000 (special issue dedicated to Professor Sukant Tripathy).
77. "Volatile Organic Compound Detection Using Nanostructured Copolymers," Li, B.; Sauve, G.; Iovu, M. C.; Jeffries-EL, M.; Zhang, R.; Cooper, J.; Santhanam, S.; Schultz, L.; Revelli, J. C.; Kusne, A. G.; (Kowalewski, T.; Snyder, J. L.; Weiss, L. E.; Fedder, G. K.; McCullough, R. D.; Lambeth, D. N. *Nanoletters* **2006**, *6*, 1598-1602.
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## Patents

#6166172

Method of forming poly(3-substituted) thiophenes

#’s 6602974, 6887965, 7098294, RE40813, RE41587, 8227566

Polythiophenes, block copolymers made therefrom, and methods of forming the same

#’s 7452958, 7834106

Living synthesis of conducting polymers including regioregular polymers, polythiophenes, and block copolymers

#7671173

Purification methods and purified polymers

#8288508

Universal Grignard metathesis polymerization

#’s 61259614, 12941932, 0111138 A1

Metal ink compositions, conductive patterns, methods, and devices

#’s 61482571, 13464605, 0304889

Metal alloys from molecular inks

#’s 61553048, 11660932, 0156971

Transparent conductive and ITO replacement materials and structures

#'s 61603852, 13777374, 0236656

Self-Reducing Metal Complex Inks Soluble in Polar Protic Solvents and Improved Curing Methods

May 7, 2020

Presidential Advisory Committee  
Florida State University

Dear Members of the Search Committee:

I am writing to express my interest in being the President of Florida State University. The opportunities for the leader at Florida State are truly exciting and match the breadth of my experience. I trained at top U.S. universities, Johns Hopkins and Columbia, and rose through the academic ranks at Carnegie Mellon University to become the Thomas Lord Professor of Chemistry. At a very early age, I was asked to become the Head of the Chemistry Department and then became the youngest Dean ever at Carnegie Mellon. After serving seven years as Dean, I was promoted to the position of Vice President for Research. In 2012, I was recruited by Harvard University to be a tenured, Full Professor and Vice Provost for Research. These collective academic experiences at four diverse and preeminent universities uniquely provide me with the leadership skills to drive the continued rise in international reputation, ranking, and academic quality at Florida State.

As part of the senior leadership team at Harvard University, I have executive experience helping to manage one of the world's best universities. I have expanded Harvard's influence and the scope of our impact through building visionary interdisciplinary research and education initiatives across Harvard and with multiple world-leading hospitals, corporations, and some of the best academic institutions. Although decentralization has meant greater challenges in finding common ground in planning for our university's future, I have found that building trusted relationships has been the key to creating new partnerships and collaborations, improving Harvard's standing in the world. I would be very excited to achieve Florida State's aspirational goals through building personal relationships and working with the Board, the leadership team, the Deans, the Athletic Director, Coaches, the faculty, and other key stakeholders.

One of the major goals I would have for Florida State is to develop important research programs and increase research funding. I would bring my experience in creating new strategic research and educational initiatives that not only increase research funding, but lead to a rise in the university and departmental rankings and set the stage for membership to the AAU. I have deep experience in building new research and educational initiatives. I have successfully built and launched the new Harvard Data Science Initiative that involves 12 Schools and over 120 faculty and has led to three new master's programs and the creation of many new undergraduate courses. I also developed and launched a new Structural Biology Program and cryo-electron microscope facility that partners Harvard Medical School, Dana Farber Cancer Institute, Massachusetts General Hospital, and Boston Children's Hospital and was funded with over \$40M. I have led the development of a new \$100M, multi-institution collaboration that has launched the building of the Advanced Biological Innovation and Manufacturing Center and Facility. The Center will be a hub for workforce training, economic development, education, and medical research for the region. I have recruited world-leading financial partners to join the collaboration including MIT, Massachusetts General Hospital, Dana-Farber Cancer Institute, Brigham and Women's Hospital, Boston Children's Hospital, Beth-Israel Deaconess Medical Center, Cytiva Life Sciences (formerly GE Life Sciences), Fujifilm

Diosynth, Alexandria Real Estate, and Millipore. Most recently, I led, developed, and wrote the Harvard University Climate Change Initiative Strategic Plan.

I oversee and manage over 25 Harvard Institutes, Centers, and Initiatives including those in the sciences, social sciences, and humanities and control \$60M in research budget allocations to support these research centers. Some examples are Harvard University Center for the Environment, Institute for Quantitative Social Sciences, Wyss Institute for Biologically-Inspired Engineering, Harvard Stem Cell Institute, Harvard Brain Initiative, Harvard Global Health Initiative, and Scholars at Risk Program. These programs represent pathbreaking initiatives of the highest quality.

Building leading research and educational programs across many disciplines, will improve Florida State's ability to recruit, retain, and showcase a world-class and diverse faculty. I would be a tireless advocate for the faculty, students, and staff and bring my deep experience in recruiting and keeping the university's talent. The backbone of the university is its faculty and their work drives the reputational excellence that attracts students, postdoctoral fellows, and staff. I have extensive experience in the tenure and promotion process, having served for over 10 years on University promotion and tenure committees and have been personally responsible for recruiting and retaining the best and diverse faculty at both Harvard University and at Carnegie Mellon.

I have an absolute passion for helping students to achieve social mobility. I grew up with limited means and supported myself through Eastfield Community College and University of Texas at Dallas and became the first person in my family with a college degree. I am extremely excited to personally help students use education as a pathway to success and giving back is deeply personal to me. As Florida State is a leader at so many levels in helping students achieve their dreams, I would be thrilled to help drive these efforts. I also have been a leader in promoting diversity. I led the hiring of a diverse faculty and created a diverse pipeline of Black/African American academics from both my research lab and as the founding creator of the Future Faculty Workshop: Diverse Leaders of Tomorrow (FFW). The FFW is an annual workshop that is in its 15<sup>th</sup> year and helps diverse postdoctoral fellows and students obtain academic jobs-essentially helping to create the pipeline. The FFW has helped to place over 50 under-represented minority professors in the U.S.

I am an enthusiastic, energetic, experienced, and excellent fundraiser. After I joined Harvard, in recognition of my fundraising experience I was asked to head up corporate and foundation fundraising. I have been quite successful and have increased corporate support by 100% (an increase of over \$25M/year) and foundation support by 50% (over \$65M/year). I am also very involved in strategic fundraising at Harvard and work closely with the President and Provost on soliciting major donors for 7 to 9 figure gifts. At Carnegie Mellon, I was a key player in the successful \$1B campaign. I wrote the research strategic plan, helped to develop the campaign themes, and led fundraising for multiple 6 and 7 figure gifts from individuals and foundations to fund new initiatives. I would look forward to leading the development of Florida State's next strategic plan and, most importantly, translating the plan into fundraising opportunities and perhaps the next capital campaign as a way to focus efforts on fundraising. Fundraising will help to provide the necessary fuel to drive Florida State's ambitions.

I have had extensive experience with government relations. I have built many close and important relationships with politicians at the federal, state, and local levels and together they have helped with driving job creation through the development of research programs and allocations to promote entrepreneurship and start-ups. I have particular experience with working with State politicians from the Governor to their staffs and legislatures to provide allocations of university resources and


the promotion of economic and workforce development. I look forward to forming partnerships with Florida State government officials to secure their maximal support of Florida State University.

I have been deeply involved in many entrepreneurial efforts over the years, including starting two companies, creating the Innovation Ecosystem, and the Greenlighting Start-ups Initiative at Carnegie Mellon that promoted the creation of university spin-out companies and corporate engagement. CMU went from two start-ups a year to 14 per year in 6 years--making CMU #1 in number of spin-outs created per research dollar in the U.S. and top 10 in total spin-outs per year. The initiative helped to attract corporate partners and companies to Pittsburgh, including: Google, Uber, Disney, Apple, Intel, Microsoft, GM, etc. At Harvard, I oversee all entrepreneurship and helped to open a new life sciences incubator, the Pagliuca Harvard Life Lab, and help to select the start-up occupants. I also have been an innovation, entrepreneurship, and technology transfer advisor to Oxford University, Princeton University, and Washington University at St. Louis, and was a member of AAU Presidents technology transfer committee. I see a fantastic opportunity to increase the focus of Florida State on student and faculty entrepreneurship, promoting the starting of university spin-out companies, and the building of corporate partnerships. I believe that despite the progress in this area, there is a great deal of room for the university to grow. The impressive new and unique College of Entrepreneurship positions Florida State to become among the leaders in the U.S. in promoting student entrepreneurship and innovation. Florida State is ripe for growth in corporate partnerships leading to increased research resources for the faculty. I am very qualified to deliver on increasing Florida State's innovation, start-ups, and corporate partnerships.

I see a tremendous opportunity for Florida State University to continue its ascension to becoming one of the world's preeminent universities and certainly the university with the fastest rise in reputation and rankings. The foundational growth of the University over the last several years has been truly impressive and the stage is set for the new President to lead the next period of success. The opportunity to build world-leading research and educational programs and new partnerships is without limit and my experience matches the aspirations of Florida State. I am a highly experienced leader that knows how to build a high-quality faculty, create important and competitive education and research programs, and achieve significant jumps in reputation and ranking.

I would be deeply honored if I were chosen as Florida State University's next President.

Sincerely,



Richard McCullough  
Vice Provost for Research  
Professor of Materials Science and Engineering  
Harvard University