Benjamin J. Wiley

Professor
Department of Chemistry
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EDUCATION

Ph.D. Chemical Engineering, June 2007
University of Washington, Department of Chemical Engineering, Seattle, WA
Dissertation: Synthesis of Silver Nanostructures with Controlled Shapes and Properties
Ph.D. Dissertation Advisor: Younan Xia, Department of Chemistry

B.S. Chemical Engineering, May 2003
University of Minnesota, Department of Chemical Engineering and Materials Science, Minneapolis, MN

POSITIONS

Professor of Chemistry, Duke University	2020-present
CTO, Sparta Biomedical	2020-present
Advisory Board Member of *Nanoscale*	2022- present
Advisory Board Member of *Nanoscale Horizons*	2022- present
Advisory Board Member of *Nanoscale Advances*	2022- present
Co-Founder of Multi3D, LLC	2016-present
Associate Professor of Chemistry, Duke University	2016-2020
Associate Editor of *Nanoscale*	2018-2022
Associate Editor of *Nanoscale Advances*	2018-2022
Assistant Professor of Chemistry, Duke University (primary appointment)	2009-2016
Founder and Chief Scientific Officer of NanoForge, Corp.	2010-2013
Postdoctoral Research Fellow, Harvard University	2007-2009
Advisor: George M. Whitesides, Department of Chemistry and Chemical Biology	
Graduate Research Fellow, University of Washington	2003-2007
Advisor: Younan Xia, Department of Chemistry	
Dissertation Title:	
Synthesis of Silver Nanostructures with Controlled Shapes and Properties	
Undergraduate Research Assistant, University of Minnesota	2001-2003
Advisors: L. E. Scriven and David J. Norris, Department of Chemical Engineering and Materials Science	

HONORS AND AWARDS

Buck-Whitney Award, Eastern New York ACS Section	2018
Highly Cited Researcher, Thomson Reuters	2018
Beilby Medal, Royal Society of Chemistry	2015
Highly Cited Researcher, Thomson Reuters	2014
NSF CAREER Award	2012
Ralph E. Powe Junior Faculty Enhancement Award	2011
Ruth L. Kirschstein National Research Service Award for Individual	

Postdoctoral Fellows, *NIH*	2008-2009
Colloid and Surface Science Division Poster Award, *ACS*	2006
Graduate Student Gold Award, *MRS*	2005
NSF-IGERT Graduate Fellowship, *University of Washington*	2004-2006
Runstad Fellowship, *University of Washington*	2003-2004
NSF-IGERT Early Bird Award in Nanotechnology, *University of Washington*	2003
Roon Award, *Federation of Societies for Coatings Technology*	2003
Iron Range Scholarship, *University of Minnesota*	1999

PEER-REVIEWED PUBLICATIONS

Publications from Independent Career

(Google Scholar: 31887 citations, h-index = 73)

125. Xu, H.; Chen, Z.; Hao, S.; Fichthorn, K.A.; Wiley, B.J. Chloride enables the growth of Ag nanocubes and nanowires by making PVP binding facet-selective. *Nanoscale.* 2023, 15, 5219.

124. Zhao, J.; Tong, H.; Kirillova, A.; Koshut, W.J.; Malek, A.; Brigham, N.C.; Becker, M.L.; Gall, K.; Wiley, B.J. A Synthetic Hydrogel Composite with a Strength and Wear Resistance Greater than Cartilage. *Adv. Funct. Mater.* 2022, 32, 2205662.

123. Koshut, W.J.; Kwon, N.; Zhao, J.; Wiley, B.J.; Gall, K.; Flaw sensitivity and tensile fatigue of a high-strength hydrogel. *International Journal of Fatigue*, 2022, 163, 107071.

122. Tang, Y.; Guo, B.; Cruz, M.A.; Chen, H.; Zhou, Q.; Lin, Z.; Xu, F.; Xu, F.; Chen, X.; Cai, D.; Wiley, B.J.; Kang, J. Colorful Conductive Threads for Wearable Electronics: Transparent Cu–Ag Nanonets. *Advanced Science*, 2022, 9, 2201111.

121. Guo, S.; Kim, M. J.; Siu, J. C.; von Windheim, N.; Gall, K.; Lin, S.; Wiley, B. J. Eight-Fold Intensification of Electrochemical Azidooxygenation with a Flow-Through Electrode. *ACS Sustain. Chem. Eng.* 2022, 10, 748.

120. Tong, H.; Pegues, H.; Samei, E.; Lo, J.Y.; Wiley, B.J. Controlling the attenuation of 3D-printed physical phantoms for computed tomography with a single material. *Medical Physics.* 2022, 49, 2582.

119. Xu, H.; Wiley, B.J. The Roles of Citrate and Defects in the Anisotropic Growth of Ag Nanostructures. *Chem Mater* 2021, 33. 8301.

118. Han, S.; Kim, J.; Lee, Y.; Bang, J.; Kim, C.G.; Choi, J.; Min, J.; Ha, I.; Yoon, Y.; Yun C.H.; Cruz, M.; Wiley, B.J.; Ko, S.H. Transparent Air Filters with Active Thermal Sterilization. *Nano Lett.* 2021, 22, 524.

117. Raciti, D.; Braun, T.; Tackett, B.M.; Xu, H.; Cruz, M.; Wiley, B.J.; Moffat, T.P. High-Aspect-Ratio Ag Nanowire Mat Electrodes for Electrochemical CO Production from CO2. *ACS Catal.* 2021, 11, 11945.

116. Pietri, T.; Wiley, B.J.; Simonato, J.P. Boron Nitride Nanotubes for Heat Dissipation in Polycaprolactone Composites. *ACS Applied Nano Materials* 2021, 4, 4774.

115. Fichthorn, K.A.; Chen, Z.; Chen, Z.; Rioux, R.M.; Wiley, B.J. Understanding the Solution-Phase Growth of Cu and Ag Nanowires and Nanocubes from First Principles. *Langmuir* 2021, 37, 4419.

114. Kim, M.J.; Cruz, M.A.; Chen, Z.; Xu, H.; Brown, M.; Fichthorn, K.A.; Wiley, B.J. Isotropic Iodide Adsorption Causes Anisotropic Growth of Copper Microplates. *Chem. Mater.* 2020, 33, 881-891.

113. Hou, Y.; Kovács, N.; Xu, H.; Sun, C.; Erni, R.; Rieder, A.; Hu, H .; Kong, Y.; Wiley, B.J.; Vesztergom, S.; Broekmann, P. Limitations of Identical Location SEM as a Method of Degradation Studies on Surfactant Capped Nanoparticle Electrocatalysts. *J. Catal.* 2020, 394, 58.

112. de Jesus Gálvez-Vázquez, M.; Moreno-García, P.; Xu, H.; Hou, Y.; Hu, H.; Zelocualtecatl Montiel, I.; Rudnev, A.V.; Alinejad, S.; Grozovski, V.; Wiley, B.J.; Arenz, M.; Broekmann, P. Environment Matters: CO2RR Electrocatalyst Performance Testing in a Gas-Fed Zero-Gap Electrolyzer. *ACS Catal.* 2020, 10, 13096.

111. Zhao, J.; Kirillova, A.; Kelly, C.N.; Xu, H.; Koshut, W.J.; Yang, F.; Gall, K.; Wiley, B.J. High-Strength Hydrogel Attachment through Nanofibrous Reinforcement. *Adv. Healthc. Mater.*, 2020, 10, 2001119.

110. Yang, F.; Zhao, J.; Koshut, W. J.; Watt, J.; Riboh, J.; Gall, K.; Wiley, B. J. A Synthetic Hydrogel Composite with the Mechanical Behavior and Durability of Cartilage. *Advanced Functional Materials* 2020, 2003451.

109. Brown, M.; Wiley, B. J. Bromide Causes Facet-Selective Atomic Addition in Gold Nanorod Syntheses. *Chemistry of Materials*, 2020, 32, 6410.

108. Yang, F.; Kim, M. J.; Brown, M.; Wiley, B. J. Alkaline Water Electrolysis at 25 A cm^{-2} with a Microfibrous Flow-through Electrode. *Advanced Energy Materials*, 2020, 2001174.

107. Manning, H.G.; Flowers, P.F.; Cruz, M. A.; Gomes da Rocha, C.; O'Callaghan, C.; Ferreira, M.S.; Wiley, B. J.; Boland, J. J. The Resistance of Cu Nanowire-Nanowire Junctions & Electro-Optical Modeling of Cu Nanowire Networks. *Appl. Phys. Lett.* 2020, 116, 251902.

106. Cardenas, J. A.; Tsang, H.; Tong, H.; Abuzaid, H.; Price, K.; Cruz, M. A.; Wiley, B. J.; Franklin, A. D.; Lazarus, N. Flash Ablation Metallization of Conductive Thermoplastics. *Addit. Manuf.* 2020, 101409.

105. Yurduseven, O.; Ye, S.; Fromenteze, T.; Wiley, B.J.; Smith, D.R. 3D Conductive Polymer Printed Metasurface Antenna for Fresnel Focusing. *Designs,* 2019, 3, 46.

104. Kim, M.J.; Brown, M.; Wiley, B.J. Electrochemical investigations of metal nanostructure growth with single crystals. *Nanoscale,* 2019, 11, 21709-21723.

103. Williams, N.X.; Noyce, S .; Cardenas, J.A.; Catenacci, M.; Wiley, B.J.; Franklin, A.D. Silver nanowire inks for direct-write electronic tattoo applications. *Nanoscale, 2019,* 11, 14294-14302.

102. Lazarus, N.; Bedair, S.S.; Hawasli, S.H.; Kim, M.J.; Wiley, B.J.; Smith, G.L. Selective Electroplating for 3D‐Printed Electronics. *Adv. Mater. Technol*., 1900126

101. Rossman, A.H.; Catenacci, M.; Zhao, C.; Sikaria, D.; Knudsen, J.E.; Dawes, D.; Gehm, M.E.; Samei, E.; Wiley, B.J.; Lo. J.Y. Three-Dimensionally-Printed Anthropomorphic Physical Phantom for Mammography and Digital Breast Tomosynthesis with Custom Materials, Lesions, and Uniform Quality Control Region. *J. Med. Imaging*, 2019, *6*, 021604.

100. Kim, M.J.; Seo, Y.; Cruz, M.A; Wiley, B.J. Metal Nanowire Felt as a Flow-Through Electrode for High-Productivity Electrochemistry. *ACS Nano*, 2019, 13, 6998-7009.

99. Kim, M.J.; Cruz, M.A.; Yang, F.; Wiley, B.J. Accelerating electrochemistry with Metal Nanowires. *Curr. Opin. Electrochem.*, 2019, *16*, 19-27.

98. Kim, M.J.; Cruz, M.A.; Ye, S.; Gray, A.L.; Smith, G.L.; Lazarus, N.; Walker, C.; Sigmarsson, H.H.; Wiley, B.J. One-Step Electrodeposition of Copper on Conductive 3D Printed Objects. *Addit. Manuf.*, 2019, *27*, 318-326.

97. Huo, D.; Kim, M.J.; Lyu, Z.; Shi, Y.; Wiley, B.J.*; Xia, Y.* One-Dimensional Metal Nanostructures: From Colloidal Syntheses to Applications. *Chem. Rev.*, 2019, 119, 8972–9073. *co-corresponding authors.

96. Kim, M.J.; Alvarez, S.; Chen, Z.; Fichthorn, K.A.; Wiley, B.J. Single-Crystal Electrochemistry Reveals Why Metal Nanowires Grow. *J. Am. Chem. Soc.*, 2018, *140*, 14740-14746.

95. Cardenas, J.A.; Upshaw, S.; Williams, N.X.; Catenacci, M.J.; Wiley, B.J.; Franklin, A.D. Impact of Morphology on Printed Contact Performance in Carbon Nanotube Thin-Film Transistors. *Adv. Funct. Mater.*, 2019, *29*, 1805727.

94. Reyes, C.; Somogyi, R.; Niu, S.; Cruz, M.A.; Yang, F., Catenacci, M.J.; Rhodes, C.P.; Wiley, B.J. Three-Dimensional Printing of a Complete Lithium Ion Battery with Fused Filament Fabrication. *ACS Appl. Energy Mater.*, 2018, *1*, 5268-5279.

93. Manning, H.G.; Niosi, F.; Gomes da Rocha, C.; Bellew, A.T.; O'Callaghan, C.; Biswas, S.; Flowers, P.F.; Wiley, B.J.; Holmes, J.D.; Ferreira, M.S.; Boland, J.J. Emergence of Winner-Takes-All Connectivity Paths in Random Nanowire Networks. *Nat. Commun.*, 2018, *9*, 3929.

92. Reyes, C.; Fu, L.; Suthanthiraraj, P.P.A.; Owens, C.E.; Shields, W.; Lopez, G.P.; Charbonneau, P.; Wiley, B.J. The Limits of Primary Radiation Forces in Bulk Acoustic Standing Waves for Concentrating Nanoparticles. *Part. Part. Syst. Charact.*, 2018, *35*, 1700470.

91. Kim, M.J.; Alvarez, S.; Tianyu, Y.; Tadepalli, V.; Fichthorn, K. A.; Wiley, B.J. Modulating the Growth Rate, Aspect Ratio, and Yield of Copper Nanowires with Alkylamines. *Chem. Mater.*, 2018, *30*, 2809-2818.

90. Cardenas, J.A.; Catenacci, M.J.; Andrews, J.B.; Williams, N.X.; Wiley, B.J.; Franklin, A.D. In-Place Printing of Carbon Nanotube Transistors at Low Temperature. *ACS Appl. Nano Mater.*, 2018, *1*, 1863-1869.

89. Catenacci, M.J.; Reyes, C.; Cruz, M.A.; Wiley, B.J. Stretchable Conductive Composites from Cu–Ag Nanowire Felt. *ACS Nano*, 2018, *12*, 3689-3698.

88. Cruz, M.A.; Ye, S.; Kim, M.J.; Reyes, C.; Yang, F.; Flowers, P.F.; Wiley, B.J. Multigram Synthesis of Cu‑Ag Core–Shell Nanowires Enables the Production of a Highly Conductive Polymer Filament for 3D Printing Electronics. *Part. Part. Syst. Char.*, 2018, *35*, 1700385.

87. Yurduseven, O.; Flowers, P.; Ye, S.; Marks, D. L.; Gollub, J. N.; Fromenteze, T.; Wiley, B. J.; Smith, D. R. Computational Microwave Imaging using 3D Printed Conductive Polymer Frequency-Diverse Metasurface Antennas. *IET Micro Antenna P.*, 2017, *11*, 1962-1969.

86. Flowers, P.F.; Reyes, C.; Ye, S.; Kim, M.J.; Wiley, B.J. 3D Printing Electronic Components and Circuits with Conductive Thermoplastic Filament. *Addit. Manuf.*, 2017, *18*, 156-163.

85. Xie, Y.; Ye, S.; Reyes, C.; Sithikong, P.; Popa, B.-I.; Wiley, B.J.; Cummer, S.A. Microwave Metamaterials Made by Fused Deposition 3D Printing of a Highly Conductive Copper-Based Filament. *Appl. Phys. Lett.*, 2017, *110*, 181903.

84. Yang, F.; Tadepalli, V.; Wiley, B.J. 3D Printing of a Double Network Hydrogel with a Compression Strength and Elastic Modulus Greater than those of Cartilage. *ACS Biomater. Sci. Eng.*, 2017, *3*, 863–869.

83. Catenacci, M.J.; Flowers, P.F.; Cao, C.; Andrews, J.B.; Franklin, A.D.; Wiley, B.J. Fully Printed Memristors from Cu–SiO_2 Core–Shell Nanowire Composites. *J. Electron. Mater.*, 2017, *7*, 4596-4603.

82. Stewart, I.E.; Kim, M.J.; Wiley, B.J. Effect of Morphology on the Electrical Resistivity of Silver Nanostructure Films. *ACS Appl. Mater. Interfaces*, 2017, *9*, 1870-1876.

81. Kim, M.J.; Flowers, P.F.; Stewart, I.E.; Ye, S.; Baek, S.; Kim, J.J.; Wiley, B.J. Ethylenediamine Promotes Cu Nanowire Growth by Inhibiting Oxidation of Cu (111). *J. Am. Chem. Soc.* 2017, *39*, 277-284.

80. Ye, S.; Stewart, I.E.; Chen, Z; Li, B.; Rathmell, A.R.; Wiley, B.J. How Copper Nanowires Grow and How To Control Their Properties. *Acc. Chem. Res.* 2016, *49*, 442-451.

79. Flowers, P.F.; Catenacci, M.J.; Wiley, B.J. High-speed, Solution-Coatable Memory Based on Cu–SiO_2 Core–Shell nanowires. *Nanoscale Horiz.*, 2016, *1*, 313-316.

78. Zhang, J.; Wang, Q.; Zhang, X.; Wang, J.; Guo, M.; Wiley, B.J.; Li, C.; Hu, C. Carbamide Promoted Polyol Synthesis and Transmittance Properties of Silver Nanocubes. *Inorg. Chem. Front.*, 2016, *3*, 547-555.

77. Stewart, I.E.; Ye, S.; Chen, Z.; Flowers, P.F.; Wiley, B.J. Synthesis of Cu-Ag, Cu-Au, and Cu-Pt Core-Shell Nanowires and Their Use in Transparent Conducting Films. *Chem. Mater.*, 2015, *27*, 7788-7794.

76. Prasai, B.; Wilson, A.R.; Wiley, B.J.; Ren, Y.; Petkov, V. On the Road to Metallic Nanoparticles by Rational Design: Bridging the Gap between Atomic-Level Theoretical Modeling and Reality by Total Scattering Experiments. *Nanoscale*, 2015, *7*, 17902-17922.

75. Li, B.; Ye, S.; Stewart, I.E.; Wiley, B.J. Synthesis and Purification of Silver Nanowires To Make Conducting Films with a Transmittance of 99%. *Nano Lett.*, 2015, *7*, 6722-6726.

74. Borchert, J.W; Stewart, I.E.; Ye, S.; Rathmell, A.R.; Wiley, B.J.; Winey, K.I. Effects of Length Dispersity and Film Fabrication on the Sheet Resistance of Copper Nanowire Transparent Conductors. *Nanoscale*, 2015, *7*, 14496-14504.

73. Ye, Y.; Pham, A.T.; Cruz, D.; Reyes, C.; Wiley, B.J.; Lopez, G.P.; Yellen, B.B. Assembly of Colloidal Molecules, Polymers, and Crystals in Acoustic and Magnetic Fields. *Adv. Mater.*, 2015, *27*, 4725-4731.

72. Alvarez, S.; Ye, S.; Flowers, P.F.; Wiley, B.J. Photocatalytic Growth of Copper Nanowires from Cu_2O Seeds. *Chem. Mater.*, 2015, *27*, 570-573.

71. Du, J.; Chen, Z.; Ye, S.; Wiley, B.J.; Meyer, T.J. Copper as a Robust and Transparent Electrocatalyst for Water Oxidation. *Angew. Chem. Int. Ed.,* 2015, *54*, 2073-2078.

70. Ye, S.; Rathmell, A.R.; Chen, Z.; Stewart, I.E.; Wiley, B.J. Metal Nanowire Networks: The Next Generation of Transparent Conductors. *Adv. Mater.*, 2014, *26*, 6670-6687.

69. Chen, Z.; Ye, S.; Stewart, I.E.; Wiley, B.J. Copper Nanowire Networks with Transparent Oxide Shells That Prevent Oxidation without Reducing Transmittance. *ACS Nano*, 2014, *8*, 9673-9679.

68. Ye, S.; Chen, Z.; Ha, Y.-C.; Wiley, B.J. Real-Time Visualization of Diffusion-Controlled Nanowire Growth in Solution. *Nano Lett.*, 2014, *14*, 4671-4676.

67. Long, R.; Zhou, S.; Wiley, B.J.; Xiong, Y. Oxidative Etching for Controlled Synthesis of Metal Nanocrystals: Atomic Addition and Subtraction. *Chem. Soc. Rev.*, 2014, *43*, 6288-6310.

66. Stewart, I.E.; Rathmell, A.R.; Yan, L.; Ye, S.; Flowers, P.F.; You, W. Wiley, B.J. Solution-Processed Copper-Nickel Nanowire Anodes for Organic Solar Cells. *Nanoscale*, 2014, *6*, 5980-5988.

65. Chen, Z.; Ye, S.; Wilson, A.R.; Ha, Y.-C.; Wiley, B.J. Optically Transparent Hydrogen Evolution Catalysts made from Networks of Copper-Platinum Core-Shell Nanowires. *Energy Environ. Sci.*, 2014, *7*, 1461-1467.

64. Ye, S.; Rathmell, A.R.; Ha, Y-C.; Wilson, A.R.; Wiley, B.J. The Role of Cuprous Oxide Seeds in the One-Pot and Seeded Synthesis of Copper Nanowires. *Small*, 2014, *10*, 1771-1778.

63. Ye, S.; Rathmell, A.R.; Stewart, I.E.; Ha, Y.-C.; Wilson, A.R.; Chen, Z.; Wiley, B.J. A Rapid Synthesis of High Aspect Ratio Copper Nanowires for High-Performance Transparent Conducting Films. *Chem*. *Commun.*, 2014, *50*, 2562-2564. *Cover Article.*

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61. Chen, Z.; Rathmell, A.R.; Ye, S.; Wilson, A.R.; Wiley, B.J. Optically Transparent Water Oxidation Catalysts Based on Copper Nanowires. *Angew. Chem. Int. Ed.*, 2013, *52*, 13708-13711. *Highlighted in C&EN.*

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57. Moreau, A.; Ciraci, C.; Mock, J.J.; Hill, R.T.; Wang, Q.; Wiley, B.J.; Chilkoti, A.; Smith, D.R. Controlled-Reflectance Surfaces with Film-Coupled Colloidal Nanoantennas. *Nature*, 2012, *492*, 86-89.

56. Rathmell, A.R.; Nguyen, M.; Chi, M.; Wiley. B.J. Synthesis of Oxidation-Resistant Cupronickel Nanowires for Transparent Conducting Nanowire Networks. *Nano Lett.*, 2012, *12*, 3193-3199.

55. Khalil, K.S.; Sagastegui, A.; Li, Y.; Tahir, M.A.; Socolar, J.E.S; Wiley. B.J.; Yellen, B.B. Binary Colloidal Structures Assembled Through Ising Interactions. *Nat. Commun.*, 2012, *3*, 794.

54. Bergin, S.M.; Rathmell, A.R.; Chen, Y.H; Charbonneau, P.; Li, Z.Y.; Wiley. B.J. The Effect of Nanowire Length and Width on the Properties of Transparent Conducting Films. *Nanoscale*, 2012, *4*, 1996-2004.

53. Zhu, Y.; Qin, Q.; Xu, F.; Fan, F.; Ding Y.; Zhang, T.; Wiley, B.J.; Wang, Z.L. Size Effects on Elasticity, Yielding, and Fracture of Silver Nanowires: *In Situ* Experiments. *Phys. Rev. B*, 2012, 045443.

52. Yang, L.; Zhang, T.; Zhou, H.; Price, S.C.; Wiley, B.J.; You, W. Solution-Processed Flexible Polymer Solar Cells with Silver Nanowire Electrodes. *ACS Appl. Mater. Interfaces*, 2011, *3*, 4075-4084.

51. Rathmell, A.R.; Wiley, B.J. The Synthesis and Coating of Long, Thin Copper Nanowires to make Flexible, Transparent Conducting Films on Plastic Substrates. *Adv. Mater.*, 2011, *23*, 4798-4803.

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48. Xu, F.; Durham, III, J.W.; Wiley, B.J.; Zhu, Y. Strain-Release Assembly of Nanowires on Stretchable Substrates. *ACS Nano*, 2011, *5*, 1556-1563.

47. Wiley, B.J.; Qin, D.; Xia, Y. Nanofabrication at High Throughput and Low Cost. *ACS Nano*, 2010, *4*, 3554-3559. (Invited Perspective).

46. Rathmell, A.R.; Bergin, S.M.; Hua, Y.-L.; Li, Z.-Y.; Wiley, B.J. The Growth Mechanism of Copper Nanowires and their Properties in Flexible, Transparent Conducting Films. *Adv. Mater.*, 2010, *22*, 3558-3563.

Postdoctoral and Graduate Publications (45)

45. Kubo, M.; Li, X.; Kim, C.; Hashimoto, M.; Wiley, B.J.; Ham, D.; Whitesides, G.M. Stretchable Microfluidic Radiofrequency Antennas. *Adv. Mater.*, 2010, *22*, 2749-2752.

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43. Guo, X.; Qiu, M.; Bao, J.; Wiley, B.J.; Yang, Q.; Zhang, X.; Ma, Y.; Yu, H.; Tong, L. Direct Coupling of Plasmonic and Photonic Nanowires for Hybrid Nanophotonic Components and Circuits. *Nano Lett.*, 2009, *9*, 4515-4519.

42. Lipomi, D.J.; Ilievski, F.; Wiley, B.J.; Deotare, P.B.; Loncar, M.; Whitesides, G.M. Integrated Fabrication and Magnetic Positioning of Metallic and Polymeric Nanowires Embedded in Thin Epoxy Slabs. *ACS Nano*, 2009, *3*, 3315-3325.

41. Siegel, A.C.; Phillips, S.T.; Wiley, B.J.; Whitesides, G.M. Thin, Lightweight, Foldable Thermochromic Displays on Paper. *Lab Chip*, 2009, *9*, 2775-2781.

40. Stan, C.A.; Schneider, G.F.; Shevkoplyas, S.S.; Hashimoto, M.; Ibanescu, M.; Wiley B.J.; Whitesides, G.M. A Microfluidic Apparatus for the Study of Ice Nucleation in Supercooled Water Drops. *Lab Chip*, 2009, *9*, 2293-2305.

39. Jones, A.C.; Olmon, R.L.; Skrabalak, S.E.; Wiley, B.J.; Xia Y.; Raschke, M.B. Mid-IR Plasmonics: Near-Field Imaging of Coherent Plasmon Modes of Silver Nanowires. *Nano Lett.*, 2009, *9*, 2553-2558.

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35. Martinez, A.W.; Phillips, S.T.; Wiley, B.J.; Gupta, M; Whitesides, G.M. FLASH: A Rapid Method for Prototyping Paper-Based Microfluidic Devices. *Lab Chip*, 2008, *8,* 2146-2150.

34. Wiley, B.J.; Lipomi, D.J.; Bao, J.; Capasso, F.; Whitesides, G.M. Fabrication of Surface Plasmon Resonators by Nanoskiving Single-Crystalline Gold Microplates. *Nano Lett.*, 2008, *8*, 3023-3028.

33. Pyayt, A.L.; Wiley, B.J.; Xia, Y.; Chen, A.; Dalton, L. Integration of Silver Nanowire Plasmonic and Photonic Waveguides. *Nat. Photonics*, 2008, *3*, 660-665.

32. Rang, M.; Jones, A.C.; Zhou, F.; Li, Z.-Y.; Wiley, B.J.; Xia, Y.; Raschke, M. B. Optical Near-Field Mapping of Plasmonic Nanoprisms. *Nano. Lett.*, 2008, *8*, 3357-3363.

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18. Wiley, B.J.; Xiong, Y.; Li, Z.-Y.; Xia, Y. Right Bipyramids of Silver: A New Shape Derived from Single Twinned Seeds. *Nano Lett.*, 2006, *6*, 765-768.

17. Zettsu, N.; McLellan, J.M.; Wiley, B.J.; Yin, Y.; Li, Z.-Y.; Xia, Y. Rhodium Multipods: Synthesis, Stability, Surface Plasmonic Properties, and Their Use as Substrates for Surface-Enhanced Raman Scattering. *Angew. Chem. Int. Ed.*, 2006, *45*, 1288-1292.

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11. Lee, Y.-T.; Im, S.-H.; Wiley, B.J.; Xia, Y. Quick Formation of Single-Crystal Nanocubes of Silver through Dual Functions of Hydrogen Gas in Polyol Synthesis. *Chem. Phys. Lett.*, 2005, *441*, 479-483.

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8. Wang, Y.; Lee, K.; Shang, H.; Wiley, B.J.; Xia, Y.; Cao, G. Ag–$Ag_{0.08}V_2O_5 \cdot n$H2O Composite Films as Host Materials for Li-ion Intercalation. *Phys. Stat. Sol. A*, 2005, *202A*, R79-R81.

7. Xiong, Y.; Chen, J.; Wiley, B.J.; Xia, Y.; Aloni, S.; Yin, Y. Understanding the Role of Oxidative Etching in the Polyol Synthesis of Palladium Nanoparticles with Uniform Shape and Size. *J. Am. Chem. Soc.*, 2005, *127*, 7332-7333.

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5. Chen, J.; Saeki, F.; Wiley, B.J.; Cang, H.; Cobb, M.J.; Li, Z.-Y.; Au, L.; Zhang, H.; Kimmey, M.; Li, X.; Xia, Y. Gold Nanocages: Bioconjugation and their Potential Use as Optical Imaging Contrast Agents. *Nano Lett.*, 2005, *5*, 473-477.

4. Im, S.-H.; Lee, Y.T.; Wiley, B.J.; Xia, Y. Large-Scale Synthesis of Silver Nanocubes: The Role of HCl in Promoting Cube Perfection and Monodispersity. *Angew. Chem. Int. Ed.*, 2005, *44*, 2154-2157.

3. Wiley, B.J.; Sun, Y.; Mayers, B.; Xia, Y. Shape-Controlled Synthesis of Metal Nanostructures: The Case of Silver. *Chem. Eur. J.*, 2005, *11*, 454-463. *cover article*

2. Wiley, B.J.; Herricks, T.; Sun, Y.; Xia, Y. Polyol Synthesis of Silver Nanoparticles: Use of Chloride and Oxygen to Promote the Formation of Single-Crystal, Truncated Cubes and Tetrahedrons. *Nano Lett.*, 2004, *4*, 1733-1739.

1. Sun, Y.; Wiley, B.J.; Li, Z.-Y.; Xia, Y. Synthesis and Optical Properties of Nanorattles and Multiple-Walled Nanoshells/Nanotubes Made of Metal Alloys. *J. Am. Chem. Soc.*, 2004, *126*, 9399-9406.

CONFERENCE PROCEEDINGS

1. Tong, H.; Pegues, H.; Yang, F.; Samei, E.; Lo, J. Y; Wiley, B. J. Controlling the Position-Dependent Contrast of 3D Printed Physical Phantoms with a Single Material. *Proc. of SPIE*, 2019, *10948*, 109484Y.
2. Pegues, H.; Knudsen, J.; Tong, H.; Gehm, M. E.; Wiley, B. J; Samei, E.; Lo, Joseph Y; Using Inkjet 3D Printing to Create Contrast-Enhanced Textured Physical Phantoms for CT, *Proc. of SPIE*, 2019, *10948*, 109484Z.
3. Rossman, A.; Catenacci, M.; Li, A. M.; Sauer, T. J.; Solomon, J.; Gehm, M. E; Wiley, B. J; Samei, E.; Lo, J. Y.; 3D Printed Anthropomorphic Physical Phantom for Mammography and DBT with High Contrast Custom Materials, Lesions and Uniform Chest Wall Region. *Proc. of SPIE*, 2018, *10573*, 105730C.
4. Zhao, C.; Solomon, J.; Sturgeon, G. M.; Gehm, M. E; Catenacci, M.; Wiley, B. J; Samei, E.; Lo, J. Y.; Third Generation Anthropomorphic Physical Phantom for Mammography and DBT: Incorporating Voxelized 3D Printing And Uniform Chest Wall QC Region, *Proc. of SPIE*, 2017, *10132*, 101321Y.

PATENTS

Patents from Independent Career

1. Wiley, B.; Rathmell, A.; Compositions and Methods for Growing Copper Nanowires. U.S. Pat. Appl. 61/337,241. 2011.
2. Wiley, B.; Synthesis of Cupronickel Nanowires and their Application in Transparent Conducting Films. U.S. Pat. Appl. 61567740. 2011.
3. Wiley, B.; Noble Metal-coated Nanostructures and Related Methods. U.S. Pat. Appl. 15/482,792. 2017.
4. Wiley, B.; Ye, S.; Three-dimensional (3D) Printing and Injection Molding Conductive Filaments and Methods of Producing and Using the Same. U.S. Pat. Appl. 16/126,515. 2018.
5. Wiley, B.; Kim, M.J; High surface area, highly conductive three-dimensional porous electrodes for electrochemical reaction applications. U.S. Pat. Appl. 16/373,466. 2019.
6. Wiley, B.; Yang, F.; Gall, K.; Riboh, J. Triple-network hydrogel implants for repair of cartilage. WO2019094426A1, 2019.
7. Wiley, B.; Yang, F. Zhao, J. Artificial cartilage. WO2021067145A1, 2020.
8. Wiley, B.; Tong, H.; Zhao, J. Nanofiber reinforcement of attached hydrogels. WO2022006363A1, 2021.

Postdoctoral and Graduate Patents

1. Xia, Y.; Im, S-H.; Lee, Y.-T.; Sun, Y.; Wiley, B. Methods for Production of Silver Nanostructures. U.S. Pat. 9,388,480.

2. Carrilho, E.; Martinez, A.W.; Mirica, K.A.; Phillips, S.T.; Siegel, A.C.; Wiley, B.; Whitesides, G.M. Three-Dimensional Microfluidic Devices. U.S. Pat. 8,628,729.

3. Siegel, A.C.; Phillips, S.T.; Dickey, M.D.; Rozkiewicz, D.; Wiley, B.;Whitesides, G.M.; Martinez, A.G. Paper-Based Microfluidic Systems and Methods of Making the Same are Described. U.S. Pat. 8,921,118.

MENTORING ACTIVITIES

Ph.D. Students

1. Aaron Rathmell (2009-2013): Millersville University of Pennsylvania (B.S. in Chemistry); Dissertation: Metal Nanowires: Synthesis, Processing, and Structure-Property Relationships in the Context of Flexible Transparent Conducting Films; Postdoctoral research associate (Merck Group); Current position: Product Engineering Manager, SI2 Technologies, North Billerica, MA.
2. Adria Wilson (2009-2014, NSF Fellow, AAS Fellow): Drexel University (B.S. in Chemistry); Dissertation: The Synthesis and Characterization of AuPd Nanoparticle Catalysts for Systematically Investigating the Effects of Bimetallic Interactions on Catalytic Performance. AAAS/MRS/TMS Congressional Fellow (U.S. Senate Office of Bernie Sanders); ORISE Fellow (U.S. Department of Energy); Current position: manager of R&D policy as part of Breakthrough Energy's U.S. Policy and Advocacy team
3. Ian Stewart (2012-2016): Randolph-Macon College (B.S. in Chemistry); Dissertation: The Impact of Morphology and Composition on the Resistivity and Oxidation Resistance of Metal Nanostructure Films. Postdoctoral Scientist (RTI International); Current position: Senior R&D Chemist, Afton Chemical.
4. Patrick Flowers (2012-2017): Southeaster Louisiana University (B.S. in Chemistry); Dissertation: Printing Electronic Components from Nanowire-Infused Ink and Highly Conductive Thermoplastic Mediums. Current position: Materials Science Department Manager, Redwire Space
5. Samuel Alvarez (2012-2017): Connecticut College (B.A. in Chemistry); Dissertation: The Role of Light and Alkylamines in Controlling the Growth of Copper Nanowires. Current Position: TD and Yield Engineer, Intel Corporation, Portland, Oregon.
6. Matthew Catenacci (2013-2018): University of Notre Dame (B.S. in Chemistry); Dissertation: Copper-based Nanowires for Printable Memory and Stretchable Conductors. Current Position: Materials Scientist, Battelle, Panama City, Fl.
7. Christopher Reyes (2014-2019, NSF Fellow): Texas State University, San Marcos (B.S. in Applied Mathematics); Dissertation: 3D Printable Lithium Ion Batteries and the Effect of Aspect Ratio of CuAg Nanowires on Graphite Anode Performance. Current Position: Process Development Consultant, X-Celeprint.

8. Feichen Yang (2015-present): Fudan University (B.S. in Chemistry); Best Presentation in Triangle Soft Matter Workshop, 2017. Marcus Hobbes Fellowship, 2018. "Microfibrous and Nanofibrous Materials for Cartilage Repair and Energy Storage." Current Position: Solution Associate, McKinsey & Company.
9. Mutya Cruz (2015-2019): Rollins College (B.A. in Chemistry); William Krigbaum Fellowship, 2018. "Synthesis and Applications of Copper Nanowires and Nanoplates." Current Position: Senior Consulting Safety Officer, Safety Partners.
10. Huayu Tong (2017-2022): Nanjing University (B.S. in Chemistry). "Orienting structure to serve medical functions." Current Position: Product Development Engineering, Zymeron Corporation.
11. Jiacheng Zhao (2018-2022): Nanjing University (B.S. in Chemistry). "Towards Hydrogel-Capped Metal Implants for Cartilage Repair." Current Position: Consultant, IQVIA.
12. Heng Xu (2018-present): Jinlin University (B.S. in Chemistry).
13. Shichen Guo (2019-present): Peking University (B.S. in Chemistry).

Postdoctoral Research Associates

1. Zuofeng Chen (2012-2014): Xiamen University (B.S. in Chemistry); University of Hong Kong (Ph.D. in Chemistry). Current Position: Professor of Chemistry, Tongji University.
2. Yoon-Cheol Ha (2012-2013): Seoul National University (B.S., M.S. in Mineral and Petroleum Engineering); Seoul National University (Ph.D. in Materials Science and Engineering). Current Position: Principal Researcher, Korea Electrotechnology Research Institute.
3. Shengrong Ye (2012-2017): East China Normal University (B.S. in Chemistry); West Virginia University (Ph.D. in Chemistry). Current Position: CTO of Multi3D LLC.
4. Myung Jun Kim (2016-2020): Seoul National University (B.S., Ph.D. in Chemical and Biological Engineering). Current Position: Professor of Applied Chemistry, Kyung Hee University.
5. Micah D. Brown (2018-2020): University of Rochester (B.S. in Chemistry); University of North Carolina, Chapel Hill (Ph.D. in Chemistry). Current Position: Visiting Professor of Chemistry, Elon University.

Visiting Scholars:

1. Jiangang Xu (2009-2010; Hunan University of Science and Technology, China)
2. Jingxia Gu (2009-2011; Institute of Chemistry, Chinese Academy of Sciences, Beijing, China)
3. Qiang Wang (2010-2012; Capital Normal University, China)
4. Jianghong Wu (2011-2013; Donghua University, China)

5. Go Kawamura (2013-2014; Toyohashi University of Technology, Japan)
6. Yoon-Cheol Ha (2013-2014; Korea Electrotechnology Research Institute)
7. Bo Li (2014-Present; Donghua University, China)
8. Duan-Jun Cai (2016; Xiamen University)
9. Mun Ho Kim (2019-2020; Pukyong National University)
10. Jean Pierre Simonato (2019-2020, CEA-Grenoble)

Undergraduate Students

1. Prithviraj Singha Roy (Fall 2009)
2. Stephen Bergin (Fall 2009, Spring 2010, 2 publications)
3. Derek Chenet (Summer 2010)
4. Evan Seidel (Spring 2010)
5. Minh Nguyen (Summer 2010, Fall 2010, Spring 2011, 1 publication)
6. Tim Zhang (Summer 2010, Fall 2010, Spring 2011, 2 publications)
7. Kathleen Lan (Spring 2011)
8. Daniel Agocs (Summer 2011 REU)
9. Tori Reynolds (Fall 2011, Spring 2011)
10. Tera Kashgarian (Fall 2011)
11. Roger Chavez (Summer 2012 REU)
12. Abbas Shikari (Summer 2012 REU)
13. Katherine Shirrell (Fall 2012, Spring 2013)
14. Ben Lee (Fall 2012)
15. Aman Kansan (Spring 2013, Fall 2013)
16. Christopher Reyes (Summer 2013 REU)
17. Gabrielle Hodgins (Summer 2013)
18. Lucy Downey (Summer 2013 REU)
19. Vaibhav Tadepalli (Fall 2013-Spring 2017, 2 publications)
20. Kaitlin Hubbard (Fall 2014, Spring 2015)
21. Rita Somogyi (Fall 2015, 1 publication)
22. Dorothy Jones (Fall 2015)
23. Samuel Brougher (Fall 2015)

24. Saumya Sao (Spring 2017)
25. Ana Rivas (Summer 2017)
26. Sarah Fordham (Summer 2017)
27. Kami Pullakhandam (Summer 2019)
28. Kennedy Sun (Summer 2019)
29. Sarabesh Natarajan (Summer 2019)
30. Rebecca Melaku (Summer 2019)

High School Students

1. Selina Boyd (Summer 2010 student from NC Project Seed)
2. Justin Yu (Summer 2011 student from NC School of Science and Mathematics)
3. Kevin Valakuzhy (Summer 2011 student from NC School of Science and Mathematics)
4. Joshua Howell (Summer 2012,2013 student from NC Project Seed)
5. Donathan Bryant (Summer 2014 student from NC Project Seed)
6. Ben Samson (Summer 2015 student from NC Project Seed)
7. Zack Lee (Summer 2016 student from NC School of Science and Mathematics)

Publications Involving Undergraduate Researchers

1. Reyes, C.; **Somogyi, R.**; Niu, S.; Cruz, M.A.; Yang, F., Catenacci, M.J.; Rhodes, C.P.; Wiley, B.J. Three-Dimensional Printing of a Complete Lithium Ion Battery with Fused Filament Fabrication. *ACS Appl. Energy Mater*. 2018, *1*, 5268-5279.

2. Kim, M.J.; Alvarez, S.; Tianyu, Y.; **Tadepalli, V.**; Fichthorn, K. A.; Wiley, B.J. Modulating the Growth Rate, Aspect Ratio, and Yield of Copper Nanowires with Alkylamines. *Chem. Mater.* 2018, *30*, 2809-2818.

3. Yang, F.; **Tadepalli, V**.; Wiley, B.J.; 3D Printing of a Double Network Hydrogel with a Compression Strength and Elastic Modulus Greater than those of Cartilage. *ACS Biomater. Sci. Eng*., 2017, *3*, 863-869.

4. Mutiso, R. M.; **Sherrott, M.C.**; Rathmell, A.R.; Wiley, B. J.; Winey K. I. Integrating Simulations and Experiments to Predict Sheet Resistance and Optical Transmittance in Nanowire Films for Transparent Conductors. *ACS Nano* 2013, *7*, 7654-7663.

5. Rathmell, A.R.; **Nguyen, M.**; Chi, M.; Wiley. B.J. Synthesis of Oxidation-Resistant Cupronickel Nanowires for Transparent Conducting Nanowire Networks. *Nano Lett.*, 2012, *12*, 3193-3199.

6. **Khalil, K.S.**; Sagastegui, A.; Li, Y.; **Tahir, M.A.**; Socolar, J.E.S; Wiley. B.J.; Yellen, B.B. Binary Colloidal Structures Assembled through Ising Interactions. *Nat. Commun.* 2012, *3*, 794.

7. **Bergin, S.M.**; Rathmell, A.R.; Chen, Y.H; Charbonneau, P.; Li, Z.Y.; Wiley. B.J. The Effect of Nanowire Length and Width on the Properties of Transparent Conducting Films. *Nanoscale* 2012, *4*, 1996-2004.

8. Zhu, Y.; Qin, Q.; Xu, F.; Fan, F.; Ding Y.; **Zhang, T.**; Wiley, B.J.; Wang, Z.L. Size Effects on Elasticity, Yielding, and Fracture of Silver Nanowires: In Situ Experiments. *Phys. Rev. B* 2012, 045443.

9. Yang, L.; **Zhang, T.**; Zhou, H.; Price, S.C.; Wiley, B.J.; You, W. Solution-Processed Flexible Polymer Solar Cells with Silver Nanowire Electrodes. *ACS Appl. Mater. Interfaces* 2011, *3*, 4075-4084.

10. Rathmell, A. R.; **Bergin, S. M.**; Hua, Y.-L.; Li, Z.-Y.; Wiley, B. J. The Growth Mechanism of Copper Nanowires and their Properties in Flexible, Transparent Conducting Films. *Adv. Mater.* 2010, *22*, 3558-3563.