

Jeffrey Clayton Foster, Ph. D.

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POSITIONS HELD AND EDUCATION

- Aug 2022 – Present *Oak Ridge National Laboratory*
Oak Ridge, TN, USA
Alvin M. Weinberg Distinguished Staff Fellow, Soft Matter Group
- Feb 2022 – July 2022 *Sandia National Laboratories*
Albuquerque, NM, USA
R&D S&E Materials Science, Organic Materials Science
- Oct 2020 – Jan 2022 *Sandia National Laboratories*
Albuquerque, NM, USA
Postdoctoral Appointee in Organic Materials Science
- Sept 2018 – Oct 2020 *University of Birmingham*
Birmingham, United Kingdom
Group Leader for Prof. Rachel O'Reilly
- Dec 2019 - Feb 2020 *Tulane University*
New Orleans, LA, USA
Visiting Scholar, supervised by Prof. Scott Grayson
- Aug 2017 – Aug 2018 *University of Warwick*
Coventry, United Kingdom
Postdoctoral Research Fellow, supervised by Prof. Rachel O'Reilly
- 2012 - 2017 *Virginia Polytechnic Institute and State University*
Blacksburg, Virginia, USA
Ph. D. in Chemistry
- 2005 - 2012 *California Polytechnic State University*
San Luis Obispo, California, USA
M. S. in Polymers and Coatings Science
B. S. in Biochemistry

RESEARCH GRANTS (PAST AND IN PROGRESS)

SNL Center for Integrated Nanoscience and Technology User Grant, *Developing self-healing commodity polymers* **\$120k**
(co-PI with co-PI Amalie Frischknecht and PI Erica Redline)

Sandia Labs Direct Customer Funding, *Polymer depolymerization*, **\$200k** (PI)

Sandia Labs Exploratory Express LDRD, *Rapid, Continuous Stereolithographic Additive Manufacturing of High Performance Thermosets* **\$95k** (Co-PI with PI Samuel Leguizamon)

Diamond Light Source Standard Access Grant, *Investigation of nanoparticle morphology evolution during ring-opening metathesis polymerisation-induced self-assembly (ROMPISA) in water* **£10k (in kind)** (Co-PI with PI Matt Derry)

PATENTS

Leguizamon, S. C.; Foster, J. C.; Cook, A. W.; Appelhans, L.; Redline, E. M.; Jones, B. H. *Selective Dual-Wavelength Olefin Metathesis Polymerization for Additive Manufacturing* US 63/250,059

Redline, E. M.; Staiger, C.; Wheeler, D. R.; Appelhans, L.; Foster, J. C. *Crosslinked Polymers with Tunable Coefficients of Thermal Expansion* US 2021/0387987

Foster, J. C.; Redline, E. M.; Ghosh, K. Staiger, C. *Benzocyclobutene Curatives for Low Thermal Expansion Thermosets* US 63/300,769 (Provisional filing)

Foster, J. C.; Redline, E. M.; Ghosh, K. Staiger, C. *Linear Polymers Comprising Dibenzocyclooctene-based Moieties Having Tunable Coefficients of Thermal Expansion* US 63/304,396 (Provisional filing)

AWARDS

Future Faculty Scholar, ACS Division of Polymeric Materials: Science and Engineering, 2019

Best Presentation Award, International Symposium of Bio-related Polymers, 2018

Outstanding Chemistry Graduate Student Award, Virginia Tech Department of Chemistry, 2016

Macromolecules Innovation Institute Travel Award, Virginia Tech MII, 2016

ACS Excellence in Graduate Polymer Research, 2016

John Wiley Book Award, 2016

Virginia Tech Graduate School Doctoral Assistantship, 2015

Chevron-Phillips Chemical Professional Excellence Travel Award, 2014 Coating

Industry Education Fund Scholarship, 2011

PUBLICATIONS (1610 citations, h-index = 23)

***Indicates corresponding author, †Indicates equal contribution**

46. Leguizamon, S. C.; Monk, N. T.; Zapien, E. M.; Yoon, A.; **Foster, J. C.**; Appelhans, L. N. "Photoinitiated Olefin Metathesis and Stereolithographic Printing of Polydicyclopentadiene" *Macromolecules*. **2022**, 55, 8273-8282.
45. Jimaja, S.; Varlas, S.; **Foster, J. C.**; Taton, D.; Dove, A. P.; O'Reilly, R. K. "Stimuli-responsive and core cross-linked micelles developed by NiCCo-PISA of helical poly(aryl isocyanide)s" *Polym. Chem.* **2022**, 13, 4047-4053.
44. Akar, I.; **Foster, J. C.**; Leng, X.; Pearce, A. K.; Maters, R. T.; O'Reilly, R. K. "Log Poct/SA Predicts the Thermoresponsive Behavior of P(DMA-co-RA) Statistical Copolymers" *ACS Macro Lett.* **2022**, 11, 4, 498-503.
43. **Foster, J. C.**; Cook, A. W.; Monk, N. T.; Jones, B. H.; Appelhans, L. N.; Redline, E. M.; Leguizamon, S. C. "Continuous Additive Manufacturing Using Olefin Metathesis" *Adv. Sci.* **2022**, 9, 14, 2200770.
42. **Foster, J. C.**; Staiger, C. L.; Dugger, J. W.; Redline, E. M. "Tuning Epoxy Thermomechanics via Thermal Isomerization: A Route to Negative Coefficient of Thermal Expansion Materials" *ACS Macro. Lett.* **2021**, 10, 940-944.

41. Carrazzone, R. J.; Li, X.; **Foster, J. C.**; Uppala, V. V. S.; Wall, C. E.; Esker, A. R.; Madsen, L. A.; Matson, J. B. “Strong Variation of Micelle–Unimer Coexistence as a Function of 2 Core Chain Mobility” *Macromolecules* **2021**, *54*, 6975-6981.
40. Jimaja, S.; Xie, Y.; **Foster, J. C.**; Taton, D.; Dove, A. P.; O’Reilly, R. K. “Functional nanostructures by NiCCo-PISA of helical poly(aryl isocyanide) copolymers” *Polym. Chem.* **2021**, *12*, 105-111.
39. Arkinstall, L. A.; Husband, J. T.; Wilks, T. R.; **Foster, J. C.***; O’Reilly, R. K. “DNA–polymer conjugates via the graft-through polymerisation of native DNA in water” *Chem. Commun.* **2021**, *57*, 5466-5469.
38. Miller, A. J.; Pearce, A. K.; **Foster, J. C.***; O’Reilly, R. K. “Probing and tuning the permeability of polymersomes” *ACS Cent. Sci.* **2020**, *7*, 30-38.
37. Varlas, S.; Hua, Z.; Jones, J. R.; Thomas, M.; **Foster, J. C.***; O’Reilly, R. K. “Complementary Nucleobase Interactions Drive the Hierarchical Self-Assembly of Core-Shell Bottlebrush Block Copolymers Toward Cylindrical Supramolecules” *Macromolecules* **2020**, *53*, 22, 9747-9757.
36. **Foster, J. C.***; Akar, I.; Grocott, M. C.; Pearce, A. K.; Mathers, R. T.; O’Reilly, R. K. “100th Anniversary of Macromolecular Science Viewpoint: The Role of Hydrophobicity in Polymer Phenomena” *ACS Macro. Lett.* **2020**, *9*, 1700-1707.
35. Carrazzone, R. J.; **Foster, J. C.**; Li, Z.; Matson, J. B. “Tuning small molecule release from polymer micelles: Varying H₂S release through cross linking in the micelle core” *Eur. Polym. J.* **2020**, 110077.
34. Akar, I; Keogh, R.; **Foster, J. C.***; Mathers, R. T.; O’Reilly, R. K. “Grafting density governs the LCST behavior of P(PEGMA-co-R-MA) copolymers” *ACS Macro Lett.* **2020**, *9*, 1149-1154.
33. Jimaja, S.; Xie, Y.; **Foster, J. C.**; Taton, D.; Dove, A. P; O’Reilly, R. K. “Functional nanostructures by NiCCo-PISA of helical poly(aryl isocyanide)s copolymers” *Polym. Chem.* **2020**, *12*, 105-112.
32. **Foster, J. C.*†**; Grocott, M. C.†; Arkinstall, L. A.; Varlas, S.; Redding, M. J.; Grayson, S. M.; O’Reilly, R. K. “It’s Better with Salt: Well-Controlled Aqueous Ring-Opening Metathesis Polymerization at Neutral pH” *J. Am. Chem. Soc.* **2020**, *142*, 13878-13885.
31. Varlas, S.; Lawrenson, S. B.; Arkinstall, L. A.; **Foster, J. C.***; O’Reilly, R. K. “Self-Assembled Nanostructures from Amphiphilic Block Copolymers Prepared via Ring-Opening Metathesis Polymerization (ROMP)” *Prog. Poly. Sci.* **2020**, *107*, 101278.
30. Yu, W.; **Foster, J. C.**; Dove, A. P.; O’Reilly, R. K. “Length control of biodegradable fibre-like micelles via tuning solubility: a self-seeding Crystallization-Driven Self-Assembly of poly(ϵ -caprolactone) containing triblock copolymers” *Macromolecules* **2020**, *53*, 1514-1521.
29. Keogh, R. K.; Blackman, L. D.; **Foster, J. C.**; Varlas, S.; O’Reilly, R. K. “The Importance of Cooperativity in Polymer Blending: Toward Controlling the Thermo-responsive Behavior of Blended Block Copolymer Micelles” *Macromol. Rapid Commun.* **2020**, *41*, 1900599.

28. Jimaja, S.; Varlas, S.; Xie, Y.; **Foster, J. C.**; Taton, D.; Dove, A. P.; O'Reilly, R. K. "NickelCatalyzed Coordination Polymerization-Induced Self-Assembly of Helical Poly(aryl isocyanide)s" *ACS Macro Lett.* **2020**, 9, 226-232.
27. Varlas, S.; Keogh, R.; Xie, Y.; **Foster, J. C.***; O'Reilly, R. K. "Polymerization-induced polymersome fusion" *J. Am. Chem. Soc.* **2019**, 141, 20234-20248.
26. Couturaud, B.; Houston, Z.; Cowin, G. J.; Prokes, I.; **Foster, J. C.**; Thurecht, K.; O'Reilly, R. K.; "A supramolecular fluorine magnetic resonance spectroscopy probe polymer based on Passerini bifunctional monomer" *ACS Macro. Lett.* **2019**, 8, 1479-1483.
25. Varlas, S. V.; **Foster, J. C.***; O'Reilly, R. K. "Ring-Opening Metathesis Polymerization-Induced Self-Assembly (ROMPISA)" *Chem. Commun.* **2019**, 55, 9066-9071.
24. Pearce, A. J.; **Foster, J. C.***; O'Reilly, R. K. "Recent Developments in Entropy-driven RingOpening Metathesis Polymerization: Mechanistic Considerations, Unique Functionality, and Sequence Control" *J. Poly. Sci. Part A: Polym. Chem.* **2019**, 148, e59722.
**Most read article of 2019-2020 in *J. Poly. Sci. Part A: Polym. Chem.*
23. Varlas, S. V.; **Foster, J. C.**; Georgiou, P.; Keogh, R.; Husband, J.; Williams, D.; O'Reilly, R. K. "Tuning the membrane permeability of nanoreactors developed by aqueous emulsion polymerization-induced self-assembly" *Nanoscale*, **2019**, 11, 12643-12654.
22. Powell, C. R.; **Foster, J. C.**; Swilley, S. N.; Scannelli, S. J.; Troya, D.; Matson, J. B. "SelfAmplified Depolymerization of Oligo(Thiourethanes) for the Release of COS/H₂S" *Polym. Chem.* **2019**, 10, 2991-2995.
21. Varlas, S.; **Foster, J. C.**; Arkinstall, L. A.; Jones, J. R.; Keogh, R.; Mathers, R. T.; O'Reilly, R. K. "Predicting Monomers for Use in Aqueous Ring-Opening Metathesis Polymerization-Induced Self-Assembly" *ACS Macro. Lett.* **2019**, 8, 466-472.
20. **Foster, J. C.**; O'Reilly, R. K. "How to better control polymer chemistry" *Science* **2019**, 363, 466-472.
19. Qian, Y.; Kujar, K.; **Foster, J. C.**; Matson, J. B. "Supramolecular Tuning of H₂S Release from Aromatic Peptide Amphiphile Gels: Effect of Core Unit Substituents" *Biomacromolecules* **2019**, 20, 1077-1086.
18. **Foster, J. C.**; Varlas, S.; Couturaud, B.; Coe, Z.; O'Reilly, R. K.; "Getting into Shape: Reflections on a New Generation of Cylindrical Nanostructures Self-Assembly using Polymer Building Blocks" *J. Am. Chem. Soc.* **2019**, 141, 2742-2753.
17. **Foster, J. C.†**; Carrazzone, R. J.*; Spear, N. B.; Radzinski, S. C.; Arrington, K. J.; Matson, J. B. "Tuning H₂S Release by Controlling Mobility in a Micelle Core" *Macromolecules* **2019**, 52, 1104-1111.
16. **Foster, J. C.**; Varlas, S.; Couturaud, B.; Jones, J. R.; Keogh, R.; Mathers, R. T.; O'Reilly, R. K.;

“Predicting Monomers for use in Polymerization Induced Self-Assembly” *Angew. Chemie. Int. Ed.* **2018**, *57*, 15733-15737.

****Selected as a Very Important Paper**

15. Inam M.; **Foster, J. C.**; Gao, J.; Hong, Y.; Du, J.; Dove, A. P.; O'Reilly, R. L. “Size and shape affects the antimicrobial activity of quaternized nanoparticles” *J. Poly. Sci. Part A: Polym. Chem.* **2018**, *57*, 255-259.
14. Couturaud, B.; Georgiou, P. G.; Varlas, S.; Jones, J. R.; Arno, M. C.; **Foster, J. C.**; O'Reilly, R. K. “Poly(Pentafluorophenyl Methacrylate)-Based Nano-Objects Developed by Photo-PISA as Scaffolds for Post-Polymerization Functionalization” *Macromol. Rapid Commun.* **2018**, *40*, 1800460.
13. **Foster, J. C.**; Varlas, S.; Blackman, L. B.; Arkinstall, L.; O'Reilly, R. K. “Ring-Opening Metathesis Polymerization in Aqueous Media using a Macroinitiator Approach” *Angew. Chemie. Int. Ed.* **2018**, *57*, 10672-10676.
12. **Foster, J. C.**[†]; Radzinski, S. C.[†]; Scannelli, S. J.; Weaver, J. R.; Arrington, K. J.; Matson, J. B. “Tapered Bottlebrush Polymers: Cone-shaped Nanostructures by Sequential Addition of Macromonomers” *ACS Macro. Lett.* **2017**, *6*, 1175-1179.
11. **Foster, J. C.**^{*}; Radzinski, S. C.^{*}; Matson, J. B. “Graft Polymer Synthesis by RAFT Transfer-to” *J. Poly. Sci. Part A: Polym. Chem.* **2017**, *55*, 2865-2876.
10. **Foster, J. C.**; Radzinski, S. C.; Finkielstein, C. V.; Matson, J. B. “H₂S-Releasing Polymer Assemblies for Studying Selective Cell Toxicity” *Mol. Pharm.* **2017**, *14*, 1300-1306.
9. **Foster, J. C.**[†]; Radzinski, S. C.[†]; Lewis, S. E.; French, E. V.; Matson, J. B. “Factors Affecting Bottlebrush Polymer Synthesis by the Transfer-to Method Using Reversible Addition–Fragmentation Chain Transfer (RAFT) Polymerization” *Polym. Chem.* **2017**, *8*, 1636-1643.
8. Powell, C. R.; **Foster, J. C.**; Okyere, B.; Theus, M. H.; Matson, J. B. “Therapeutic Delivery of H₂S via COS: Small Molecule and Polymeric Donors with Benign Byproducts” *J. Am. Chem. Soc.* **2016**, *138*, 13477-13480.
7. **Foster, J. C.**[†]; Radzinski, S. C.[†]; Matson, J. B. “Bottlebrush Synthesis by Ring-Opening Metathesis Polymerization: The Significance of the Anchor Group” *J. Am. Chem. Soc.* **2016**, *138*, 6698-7004.
6. Radzinski, S. C.; **Foster, J. C.**; Matson, J. B.; “Preparation of Bottlebrush Polymers via a One-Pot Ring-Opening Polymerization (ROP) and Ring-Opening Metathesis Polymerization (ROMP) Grafting-Through Strategy” *Macromol. Rapid. Commun.* **2016**, *37*, 616-621.
5. **Foster, J. C.**[†]; Radzinski, S. C.[†]; Lewis, S. E.; Slutzker, M. B.; Matson, J. B. “Norbornenecontaining dithiocarbamates for use in reversible addition–fragmentation chain transfer (RAFT) polymerization and ring-opening metathesis polymerization (ROMP)” *Polymer* **2015**, *79*, 205211.

4. Carter, J. M.; Qian, Y.; **Foster, J. C.**; Matson, J. B. "Peptide-Based Hydrogen Sulfide-Releasing Gels" *Chem. Commun.* **2015**, 51, 13131-13134.
3. **Foster, J. C.**[†]; Radzinski, S. C.[†]; Matson, J. B. "Synthesis of Bottlebrush Polymers via Grafting-From and Grafting-Through Approaches Using a RAFT Chain Transfer Agent with a ROMP-Active Z-Group" *Polym. Chem.* **2015**, 6, 5643-5652.
2. **Foster, J. C.**; Matson, J. B. "Functionalization of Methacrylate Polymers with Thiooximes: A Robust Post-Polymerization Modification Reaction and a Method for the Preparation of H₂S-Releasing Polymers" *Macromolecules* **2014**, 47, 5089-5095.
1. **Foster, J. C.**; Powell, C. R.; Radzinski, S. C.; Matson, J. B. "S-Aroylthiooximes: A Facile Route to Hydrogen Sulfide Releasing Compounds with Structure-Dependent Release Kinetics" *Org. Lett.* **2014**, 16, 1558-1561.

CONFERENCE ORAL PRESENTATIONS

"Metathesis Chemistry in Aqueous Media", 258th *National Meeting of the American Chemical Society*, San Diego, CA, USA **2019**

"Nanostructure synthesis by ring-opening metathesis polymerization-induced self-assembly", 258th *National Meeting of the American Chemical Society*, San Diego, CA, USA **2019**

"Advances in Aqueous Metathesis", 23rd *International Symposium on Metathesis and Related Chemistry*, Barcelona, Spain **2019**

"Advances in Aqueous Ring-Opening Metathesis Polymerization" Graduate Research Symposium, *Gordon Research Conference – Polymers*, South Hadley, MA, USA **2019**

"Ring-Opening Metathesis Polymerization in Aqueous Media using a Macroinitiator Approach" *Bordeaux Polymer Conference*, Bordeaux, France **2018**

"Self-Assembly of Nucleobase-Functionalized Bottlebrush Polymers" 255th *National Meeting of the American Chemical Society*, New Orleans, LA, USA **2018**

"A general strategy for preparing block copolymers and nanoparticles via ROMP in aqueous media", 255th *National Meeting of the American Chemical Society*, New Orleans, LA, USA **2018**

"Anti-Cancer Activity of H₂S-Releasing Micelles" 12th *National Graduate Research Polymer Conference*, Akron, OH **2016**

"Morphological Control over the Release Profile of H₂S-Releasing Micelles" 250th *National Meeting of the American Chemical Society*, San Diego, CA **2016**

"Polymer Functionalization with Thiooximes: A facile Route to H₂S-Releasing Polymers" 248th *National Meeting of the American Chemical Society*, San Francisco, CA **2014**

CONFERENCE POSTER PRESENTATIONS

"Nanoparticle Synthesis using Aqueous Ring Opening Metathesis Polymerization" 14th *International Conference on Materials Chemistry*, Birmingham, UK **2019**

“Aqueous Metathesis Chemistry Using a Macroinitiator Approach” *Gordon Research Conference – Polymers*, South Hadley, MA **2019**

“Supramolecular Scaffolds for Therapeutic Delivery of Hydrogen Sulfide” *Gordon Research Conference – Polymers*, South Hadley, MA **2017**

“Synthesis of Tapered Bottlebrush Polymers via Sequential Addition of Macromonomers” *Gordon Research Conference – Polymers*, South Hadley, MA **2017**

“H₂S-Releasing Polymer Assemblies for Studying Selective Cell Toxicity” *MII Technical Conference and Review*, Blacksburg, VA **2016**

“Anti-Cancer Activity of H₂S-Releasing Micelles” *250th National Meeting of the American Chemical Society*, San Diego, CA **2016**

“Anti-Cancer Activity of H₂S-Releasing Micelles” *VTCCDD Drug Discovery Day*, Blacksburg, VA **2015**

“Advanced H₂S-Releasing Materials for Therapeutic Applications” *Gordon Research Conference – Polymers*, South Hadley, MA **2015**

“Advanced H₂S-Releasing Materials for Therapeutic Applications” *MII Technical Conference and Review*, Blacksburg, VA **2015**

“Preparation of H₂S-Releasing Prodrugs and Materials for Therapeutic Applications” *VTCCDD Drug Discovery Day*, Blacksburg, VA **2014**

“Development of a Quantitative Fluorescence Method for Measurement of Corrosion in Coated Aluminum” *Western Coatings Symposium*, Las Vegas, NV **2011**

PROFESSIONAL AFFILIATIONS

Member of the American Chemical Society

Member of the Royal Society of Chemistry

AD HOC REVIEWER

Journal of the American Chemical Society

Chemical Science

Macromolecules

ACS Macro Letters *Macromolecules*

Polymer Chemistry

Polymer

Materials Advances

Macromolecular Rapid Communications

Materials Chemistry Frontiers