



**Exponent**<sup>®</sup>  
Engineering & Scientific Consulting

## Emily Churchill, Ph.D.

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### Professional Profile

Dr. Churchill specializes in surface and bulk characterization of polymeric materials. She routinely utilizes her experience in chemistry and polymer science to assist clients with materials analysis and selection during product development. She also performs root cause investigations of finished goods with an emphasis on compatibility testing, material degradation and contamination

A chemist by training, Dr. Churchill is experienced in the synthesis, characterization, and chemical dynamics of small organic compounds and macromolecules. She employs techniques such as NMR, FTIR, and UV-Vis spectroscopies for chemical identification, and GPC, TGA, DSC, and DLS for polymer characterization. She is trained in various imaging methods including CT and SEM. She uses analytical chemistry tools, GC-MS and LC-MS, to detect extractable compounds and contaminants.

Prior to joining Exponent, Dr. Churchill obtained her Ph.D. in chemistry from Columbia University, where she specialized in light-responsive materials. Specifically, she focused on designing materials for photon upconversion to be implemented in low energy photochemical transformations.

### Academic Credentials & Professional Honors

Ph.D., Chemistry, Columbia University, 2022

M.S., Chemistry, Columbia University, 2021

B.S., Chemistry, Truman State University, 2017

National Science Foundation Graduate Research Fellow, 2019-2022

### Patents

U.S. Patent 10980883, "Triplet fusion upconversion for infrared-sensitized photoredox chemistry," April 20, 2021 (Campos, L. M.; Congreve, D. N.; Pun, A. B.; Fallon, K.; Churchill, E. M.; Rovis, T. R.; Ravetz, B.)

### Publications

"Promoting Multiexciton Interactions in Singlet Fission and Triplet Fusion Upconversion Dendrimers" He, G.; Churchill, E. M.; Parenti, K. R.; Zhang, J.; Narayanan, P.; Namata, F.; Malkoch, M.; Congreve, D. N.; Cacciuto, A.; Sfeir, M. Y.; Campos, L. M. *Nat. Commun.* 2023, 14, 6080.

"Photon Upconversion Hydrogels for 3D Optogenetics" Meir, R.; Hirschhorn, T.; Kim, S.; Fallon, K. J.; Churchill, E. M.; Wu, D.; Yang, H. W.; Stockwell, B. R.; Campos, L. M. *Adv. Funct. Mater.* 2021, 2010907.

“In-Silico Prediction of Annihilators for Triplet-Triplet Annihilation Upconversion via Auxiliary-Field Quantum Monte Carlo” Weber, J. L.; Churchill, E. M.; Jockusch, S.; Arthur, E. J.; Pun, A. B.; Zhang, S.; Friesner, R. A.; Campos, L. M.; Reichman, D. R.; Shee, J. *Chem. Sci.* 2021, 12, 1068.

“Molecular Engineering of Chromophores to Enable Triplet-Triplet Annihilation Upconversion” Fallon, K. J.; Churchill, E. M.; Sanders, S. N.; Shee, J.; Weber, J. L.; Meir, R.; Jockusch, S.; Reichman, D. R.; Sfeir, M. Y.; Congreve, D. N.; Campos, L. M. *J. Am. Chem. Soc.* 2020, 142, 47, 19917-19925.

“Photoredox Catalysis using Infrared Light via Triplet Fusion Upconversion” Ravetz, B. D.; Pun, A. B.; Churchill, E. M.; Congreve, D. N.; Rovis, T.; Campos, L. M. *Nature* 2019, 565, 343-346.