

Youngwoo Choo

9 Hillhouse Ave. Rm 226
New Haven, CT 06511

Youngwoo.Cho@Yale.Edu
(215) 300 - 9327
www.eng.yale.edu/polymers/ychoo.html

EDUCATION

Yale University, New Haven, CT 2012 – Present
Ph.D. Student in Chemical and Environmental Engineering

Seoul National University, Seoul, South Korea
M.S., Chemical and Biological Engineering 2011
B.S., Chemical and Biological Engineering 2009

RESEARCH EXPERIENCE

Yale University, Department of Chemical and Environmental Engineering, New Haven, CT 2012 – Present
Graduate Research Advisor: Prof. Chinedum Osuji

- Investigated magnetic field-induced alignment of liquid crystalline brush-like block copolymers
- Sequential electrospray deposition of block copolymer thin films

Brookhaven National Laboratory, Center for Functional Nanomaterials, Upton, NY Summer 2016
Research Advisor: Dr. Kevin Yager

- Investigated pathway-dependence of BCP array using soft-shear laser zone annealing

Seoul National University, Dept. of Chemical and Biological Engineering, Seoul, South Korea 2009 – 2012
Graduate Research Advisor: Prof. Kookheon Char

- Studied the surface roughness effect on the orientation of BCP microdomain in thin films

PUBLICATIONS

17. **Y. Choo**, P. W. Majewski, M. Fukuto, C. O. Osuji, K. G. Yager, Pathway-Engineering for Highly-Aligned Block Copolymer Arrays., *Nanoscale*, *Accepted*
16. G. Kaufman, W. Liu, D. M. Williams, **Y. Choo**, M. Gopinadhan, N. Samudrala, R. Sarfati, E. C. Y. Yan, L. Regan, C. O. Osuji, Flat drops, elastic sheets and microcapsules by interfacial assembly of a bacterial biofilm protein, BslA., *Langmuir*, 33 (37), 13590-13597 (2017)
15. M. Gopinadhan[†], **Y. Choo**[†], L. Mahajan, D. Ndaya, G. Kaufman, Y. Rokhlenko, R. M. Kasi, C. O. Osuji, Directing Block Copolymer Self-Assembly with Permanent Magnets: Photopatterning Microdomain Alignment and Generating Oriented Nanopores., *Molecular Systems Design and Engineering*, *Accepted* ([†]Contributed equally)
14. M. Gopinadhan, **Y. Choo**, K. Kawabata, G. Kaufman, X. Feng, X. Di, Y. Rokhlenko, L. Mahajan, D. Ndaya, R. M. Kasi, C. O. Osuji, Controlling Orientational Order in Block Copolymers Using Low Intensity Magnetic Fields., *Proceedings of the National Academy of Sciences*, 114 (45), E9437-E9444 (2017)
13. G. Kaufman, S. Mukhopadhyay, Y. Rokhlenko, S. Nejati, R. Boltyanskiy, **Y. Choo**, M. Loewenberg, C. O. Osuji, Highly stiff yet elastic microcapsules incorporating cellulose nanofibrils., *Soft Matter*, 13, 2733-2737 (2017)
12. C. Kanimozhi, M. Kim, S. R. Larson, J. W. Choi, **Y. Choo**, D. P. Sweat, C. O. Osuji, P. Gopalan, Isomeric Effect Enabled Thermally Driven Self-Assembly of Hydroxystyrene-Based Block Copolymers., *ACS Macro Letters* 5 (7), 833-838 (2016)
11. M. Gopinadhan, **Y. Choo**, C. O. Osuji, Strong Orientational Coupling of Block Copolymer Microdomains to Smectic layering Revealed by Magnetic Field Alignment., *ACS Macro Letters* 5 (3), 292-296 (2016)

10. **Y. Choo**, H. Hu, K. Toth, C. O. Osuji, Sequential Deposition of Block Copolymer Thin Films and Formation of Lamellar Heterolattices by Electrospray Deposition., *Journal of Polymer Science Part B: Polymer Physics* 54 (2), 247-253 (2016)
9. J. P. Singer, C. I. Pelligra, N. Kornblum, **Y. Choo**, M. Gopinadhan, P. Bordeenithikasem, J. Ketkaew, S. F. Liew, H. Cao, J. Schroers, C. O. Osuji, Multiscale Patterning of a Metallic Glass Using Sacrificial Imprint Lithography., *Microsystems and Nanoengineering* 1, 15040 (2015)
8. **Y. Choo**[†], L. H. Mahajan[†], M. Gopinadhan, D. Ndaya, P. Deshmukh, R. M. Kasi, C. O. Osuji, Phase Behavior of Polylactide-Based Liquid Crystalline Brushlike Block Copolymers., *Macromolecules* 48 (22), 8315-8322 (2015) ([†]Contributed equally)
7. X. Lu, S. Nejati, **Y. Choo**, C. O. Osuji, Elements Provide a Clue: Nanoscale Characterization of Thin-Film Composite Polyamide Membranes., *ACS Applied Materials and Interfaces* 7 (31), 16917-16922 (2015)
6. H. Hu, **Y. Choo**, X. Feng, C. O. Osuji, Physical Continuity and Vertical Alignment of Block Copolymer Domains by Kinetically Controlled Electrospray Deposition., *Macromolecular Rapid Communications* 36 (13), 1290-1296 (2015)
5. X. Feng, M. E. Tousley, M. G. Cowan, B. R. Wiesenauer, S. Nejati, **Y. Choo**, R. D. Noble, M. Elimelech, D. L. Gin, C. O. Osuji, Scalable Fabrication of Polymer Membranes with Vertically Aligned 1-nm Pores by Magnetic Field Directed Self-Assembly., *ACS Nano* 8 (12), 11977-11986 (2014)
4. D. P. Sweat, M. Kim, S. R. Larson, J. W. Choi, **Y. Choo**, C. O. Osuji, P. Gopalan, Rational Design of a Block Copolymer with a High Interaction Parameter., *Macromolecules* 47 (19), 6687-6696 (2014)
3. M. Gopinadhan, P. Deshmukh, **Y. Choo**, P. W. Majewski, O. Bakajin, M. Elimelech, R. M. Kasi, C. O. Osuji, Thermally Switchable Aligned Nanopores by Magnetic-Field Directed Self-Assembly of Block Copolymers., *Advanced Materials* 26 (30), 5148-5154 (2014)
2. P. Deshmukh, M. Gopinadhan, **Y. Choo**, S-K. Ahn, P. W. Majewski, S. K. Yoon, O. Bakajin, M. Elimelech, C. O. Osuji, R. M. Kasi, Molecular Design of Liquid Crystalline Brush-Like Block Copolymers for Magnetic Field Directed Self-Assembly: A Platform for Functional Materials., *ACS Macro Letters* 3, 462-466 (2014)
1. M. Gopinadhan, P. W. Majewski, **Y. Choo**, and C. O. Osuji, Order-Disorder Transition and Alignment Dynamics of a Block Copolymer Under High Magnetic Fields by In Situ X-Ray Scattering, *Physical Review Letters* 110, 078301 (2013)

TEACHING EXPERIENCE

Teaching Fellow, Yale University, New Haven, CT

- | | |
|---|------|
| • CENG 412L: Chemical Engineering and Laboratory Design | 2017 |
| • CENG 412L: Chemical Engineering and Laboratory Design | 2015 |
| • MENG 211: Thermodynamics for Mechanical Engineers | 2014 |
| • ENAS 194: Ordinary and Partial Differential Equation | 2013 |

Teaching Assistant, Seoul National University, Seoul, South Korea

- | | |
|---|------|
| • Chemical and Biological Process Laboratory | 2010 |
| • Elementary Laboratory for Chemical and Biological Engineers | 2009 |

FELLOWSHIPS

- | | |
|--|-------------|
| • Academic Scholarships of Seoul National University | 2009 – 2010 |
| • Korean National Science and Technology Scholarship | 2003 – 2009 |

PRESENTATIONS

11. Y. Choo, P. Majewski, K. Yager, and C. O. Osuji, Pathway-engineered highly aligned block copolymer array using soft-shear laser zone annealing, *American Physical Society*, New Orleans, LA, March 13, 2017. (Oral)

10. Y. Choo, H. Hu, K. Toth, and C. O. Osuji, Lamellae heterolattice structure using sequential electrospray deposition of block copolymers, *Gordon Research Conference – Polymer Physics*, Mount Holyoke College, MA, July 24, 2016. (Poster)
9. Y. Choo, H. Hu, K. Toth, and C. O. Osuji, Formation of Lamellar Heterolattices in Block Copolymer Thin Films by Electrospray Deposition, *American Physical Society*, Baltimore, MD, March 17, 2016. (Oral)
8. Y. Choo, M. Gopinadhan, L. H. Mahajan, R. M. Kasi, C. O. Osuji, Liquid Crystalline Block Copolymers with Brush Type Architecture: Towards Functional Membranes by Magnetic Field Alignment, *American Physical Society*, San Antonio, TX, March 5, 2015. (Oral)
7. Y. Choo, Magnetic Field Induced Alignment of Liquid Crystalline Block Copolymers: Alignment Dynamics and Its Application for Aligned Nanopores, *University of Connecticut Polymer Student Seminar Series*, Storrs, CT, November 19, 2014. (Oral, Invited)
6. Y. Choo, M. Gopinadhan, P. Deshmukh, P. W. Majewski, O. Bakajin, M. Elimelech, R. M. Kasi, C. O. Osuji, Stimuli-Responsive Block Copolymer Nanoporous Template by Magnetic-Field Alignment., *American Physical Society*, Denver, CO, March 5, 2014. (Poster)
5. Y. Choo, H. S. Suh, J. G. Son, T. Kim, and K. Char, Effect of Interfacial Boundary Conditions on the Surface Morphology of PS-b-PMMA Thin Films, *Korea Synchrotron Radiation Users Association*, Pohang, Korea, November 17, 2011. (Poster)
4. Y. Choo, H. S. Suh, T. Kim, and K. Char, Orientation Control of Block Copolymer Thin Films on Substrates with Well-Defined Roughness, *Korean Institute of Chemical Engineers*, Changwon, Korea, April 29, 2011. (Oral)
3. Y. Choo, H. S. Suh, H.-M. Kim, M. R. Cho, Y. D. Park, K.-B. Kim, and K. Char, Orientation Control of Block Copolymer Films on Rough Substrates Prepared by E-beam Lithography, *American Physical Society*, Dallas, USA, March 23, 2011. (Poster)
2. Y. Choo, H. S. Suh, H.-M. Kim, K.-B. Kim, and K. Char, Orientation Control of Microphase-Separated Block Copolymer Thin Films Using Substrates with Controlled Roughness, *Polymer Society of Korea*, Daegu, Korea, October 7, 2010. (Poster)
1. Y. Choo, H. Yoon, and K. Char, Effect of Uncured Precursors in Bending of Janus Nanopillars, *Nano Korea 2010*, Ilisan, Korea, August 20, 2010. (Poster)

SKILLS

- Small/Wide-Angle X-ray Scattering, DSC, AFM, SEM, TEM, POM
- Skillful Ultramicrotomy (Room temperature/cryo-sectioning) of soft material: Trained 20+ trainees at the Yale Institute for Nanoscience and Quantum Engineering
- Metal machining (Phase 2 trained at Yale Center for Engineering Innovation and Design)