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EDUCATION

Ph.D., Chemical Engineering – Northwestern University

Sept 2012 – Feb 2017

- Thesis adviser: **Prof. John M. Torkelson**, GPA: 3.71/4.00.
- Thesis title: Segmented Polyhydroxyurethane (PHU) as Novel Non-Isocyanate Polyurethane Functional Materials.
 - Developed the first thermoplastic PHU elastomers from non-isocyanate precursors, demonstrated the critical influence of hydroxyl groups and soft segment choice in controlling nanophase separation.
 - Discovered the utility of thermoplastic segmented PHU as broad-temperature-range acoustic damping materials.
 - Demonstrated the ability to significantly tune nanophase separation behavior of segmented PHUs via judicious choice of soft segment.
 - Conducted structure-property-relationship studies on the influence of carbonate hard-segment and diamine chain extender molecular structures on morphology and properties of segmented PHUs.
 - Achieved PHU thermoplastic elastomers with properties competitive to conventional polyurethane.
- Authored eight manuscripts and wrote two invention concept disclosures in collaboration with scientists from the Northwestern Chemistry Department and The Dow Chemical Company at Freeport, TX.
- Supervised one M.S. student in formulation and execution of several research projects.
- Completed two internships in research and development function with Valspar and 3M.
- Selected courses: Polymer Rheology, Soft Materials, Materials and Nanochemistry, Nanopatterning and Fabrication, Polymer Reaction Engineering, Kinetics and Reactor Design.
- Skills: small molecule monomer synthesis, polymer synthesis, dynamic mechanical analysis (DMA), differential scanning calorimetry (DSC), rheology, NMR spectroscopy, FTIR spectroscopy, small-angle X-ray scattering, tensile testing, gel permeation chromatography (GPC), TGA, etc.

B. Eng., Chemical & Biomolecular Engineering – Nanyang Technological University Aug 2005 - Jun 2009

- Graduated with First Class Honors. Cumulative GPA: 4.72/5.00
- Thesis: Synthesis and Characterization of Novel Polyamidoamine for Gene Delivery
- Honors: ASEAN Scholarship, Nanyang President Research Scholarship, Dean's List (Top 5%) 2005-2007

AWARDS AND HONORS

1. Eastman Chemical Award in Applied Polymer Science, Finallist
2. Nonequilibrium Energy Research Center Fellowship, Northwestern University Dec 2012-Dec 2013
3. ASEAN Undergraduate Scholarship 2005-2009
4. Nanyang President's Research Scholarship 2007-2008
5. Dean's List, Chemical and Biomolecular Engineering, NTU 2006-2007

PUBLICATIONS, PRESENTATIONS & DISCLOSURES

Peer-Reviewed Publications

1. **Beniah, G.**; Fortman, D. J.; Heath, W. H.; Dichtel, W. R.; Torkelson, J. M., "Major enhancement in properties of non-isocyanate polyurethane thermoplastic elastomer with amide-based chain extender", In Preparation.
2. **Beniah, G.**; Fortman, D. J.; Heath, W. H.; Dichtel, W. R.; Torkelson, J. M., "Non-isocyanate polyurethane thermoplastic elastomers: amide-based chain extender yields enhanced nanophase separation and properties in polyhydroxyurethane", *Macromolecules* In Revision.
3. **Beniah, G.**; Heath, W. H.; Torkelson, J. M., "Functionalization of hydroxyl groups eliminates nanophase separation in polyhydroxyurethane", Submitted to *Journal of Polymer Science, Part A: Polymer Chemistry*.
4. **Beniah, G.**; Chen, X.; Uno, B. E.; Liu, K.; Leitsch, E. K.; Jeon, J.; Heath, W. H.; Scheidt, K. A.; Torkelson, J. M., "Combined effects of carbonate and soft-segment molecular architectures on the nanophase separation and

- properties of segmented polyhydroxyurethane”, *Macromolecules* **2017**, 50, 3193-3203.
5. **Beniah, G.**; Heath, W. H.; Jeon, J.; Torkelson, J. M., “Tuning the properties of segmented polyhydroxyurethanes via chain extender structure”, *Journal of Applied Polymer Science* **2017**, 134, 44942.
 6. **Beniah, G.**; Uno, B. E.; T. Lan; Jeon, J.; Heath, W. H.; Scheidt, K. A.; Torkelson, J. M., “Tuning nanophase separation behavior of segmented polyhydroxyurethane copolymers via judicious choice of soft segment”, *Polymer* **2017**, 110, 218-227.
 7. **Beniah, G.**; Liu, K.; Heath, W. H.; Miller, M. D.; Scheidt, K. A.; Torkelson, J. M., “Novel thermoplastic polyhydroxyurethane elastomers as effective damping materials over broad temperature ranges”, *European Polymer Journal* **2016**, 84, 770-783. In special issue: Sustainable Polyurethanes.
 8. Leitsch, E. K.*; **Beniah, G.***, Liu, K.; Lan, T.; Scheidt, K. A.; Torkelson, J. M., “Non-isocyanate thermoplastic polyhydroxyurethane elastomer via cyclic carbonate aminolysis: critical role of hydroxyl groups in controlling nanophase separation”, *ACS Macro Letters* **2016**, 5, 424-429. **co-first author*
 9. Zhuang, Q.; Walker, D. A.; Browne, K. P.; Kowalczyk, B.; **Beniah, G.**; Grzybowski, B. A., “Temperature driven assembly of like-charged nanoparticles at non-planar liquid-liquid or gel-air interfaces”, *Nanoscale* **2014**, 6, 4475-4479.
 10. Khan, M.; **Beniah, G.**; Wiradharma, N.; Guo, X.; Yang, Y.-Y., “Brush-like amphoteric poly(isobutylene-alt-(maleic acid)-graft-oligoethyleneamine)/DNA complexes for efficient gene transfection”, *Macromolecular Rapid Communication* **2010**, 31, 1142-1147.
 11. Khan, M.; Wiradharma, N.; **Beniah, G.**; Bte M. Rafiq, N.; Liu, S.; Au, J.; Yang, Y.-Y., “Branched disulfide-based polyamidoamines capable of mediating high gene transfection”, *Current Pharmaceutical Designs* **2010**, 21, 2341-2349.

Presentations

1. **Beniah, G.**; Uno, B. E.; Lan, T.; Heath, W. H.; Scheidt, K. A.; Torkelson, J. M., “Tuning nanophase separation behavior in segmented polyhydroxyurethanes via judicious choice of soft segment”, AICHE Annual Meeting 2016, San Francisco, CA. *Oral Presentation*
2. **Beniah, G.**; Uno, B. E.; Heath, W. H.; Scheidt, K. A.; Torkelson, J. M., “Influence of carbonate molecular structures on the morphology and properties of non-isocyanate, segmented polyhydroxyurethane copolymers”, AICHE Annual Meeting 2016, San Francisco, CA. *Oral Presentation*
3. **Beniah, G.**; Liu, K.; Heath, W. H.; Scheidt, K. A.; Torkelson, J. M., “Thermoplastic polyhydroxyurethane as non-isocyanate polyurethane elastomer: novel application as broad-temperature-range damping material and tunable phase behavior”, Pacifichem Conference 2015, Honolulu, HI. *Oral Presentation*
4. **Beniah, G.**; Uno, B. E.; Wilmot, N.; Heath, W. H.; Scheidt, K. A.; Torkelson, J. M., “Cyclic carbonate as building blocks for sustainable synthesis of non-isocyanate polyurethane elastomers”, Pacifichem Conference 2015, Honolulu, HI. *Poster Presentation*
5. **Beniah, G.**; Leitsch, E. K.; Liu, K.; Wilmot, N.; Heath, W. H.; Scheidt, K. A.; Torkelson, J. M., “Non-isocyanate thermoplastic polyhydroxyurethane elastomers from cyclic carbonate aminolysis”, AICHE Annual Meeting, November 2015, Salt Lake City, UT. *Oral Presentation*
6. **Beniah, G.**; Leitsch, E. K.; Liu, K.; Wilmot, N.; Heath, W. H.; Scheidt, K. A.; Torkelson, J. M., “Tunability of phase behavior in thermoplastic polyhydroxyurethane: interplay of soft segment and hydrogen bonding”, ACS Fall Meeting, August 2015, Boston, MA. *Oral Presentation*
7. **Beniah, G.**; Torkelson, J. M., “Novel Thermoplastic Polyhydroxyurethane Elastomer: Non-isocyanate polyurethane elastomer and effective damping materials over broad temperature ranges”, On-site presentation at The Dow Chemical Company, Freeport, TX. *Oral Presentation*

Conference Proceedings

1. Khan, M.; Bte Mohd Rafiq, N.; **Beniah, G.**; Yang, Y.-Y. “Comb-like reducible polyamidoamines for efficient gene transfection”, *Polymer Preprints* 2008, 49, 1040.
2. **Beniah, G.**; Khan, M.; Yang, Y.-Y. “Self-assembly of star-like, water soluble, cationic amphiphilic copolymer as efficient gene delivery vector”, *Polymer Preprints* 2008, 99, 284.

Invention Concept Disclosures

1. Thermoplastic polyhydroxyurethane elastomer as effective damping material over a broad temperature ranges. Disclosure filed March 2015.
2. Thiol-Norbornene UV-cured thermoplastic elastomers. Disclosure filed August 2015.

PROFESSIONAL EXPERIENCE

Postdoctoral Fellow – Dept. of Chemical Engineering, University of Texas at Austin, TX *May 2017 - Present*

- Advisers: **Prof. Keith P. Johnston** and **Prof. Nathaniel A. Lynd**.
- Research focus: development of polymer coated magnetic nanoparticle for subsurface imaging of oil reservoir application and to improve its mobility at extremely high salinity and temperature.

Manufacturing Technology Intern – 3M Company, Maplewood, MN *May –September 2016*

- Worked in film manufacturing and supply chain operations (FMSCO) division and collaborated with corporate analytical laboratory to develop new measurement technique to characterize film friction.
- Investigated the effect of residual oligomer deposited at the roller surface on friction behavior of cast PET.
- Studied the physical aging and creep behavior of multilayer optical film with uneven draw ratio.

Research & Development Intern – The Valspar Corporation, Marengo, IL *June - September 2015*

- Worked with industrial resin business to develop and evaluate new experimental resins such as water-borne acrylics and water-dispersed alkyds for industrial coating applications.
- Employed design of experiments (DOE) to optimize coating formulations to enhance their anti-corrosion performance and metal adhesion properties.
- Participated in development and optimization of new resin for edge seal application that resulted in product commercialization.

Manufacturing Engineer – Lonza Biologics Tuas Pte. Ltd, Singapore (SG) *Feb 2010 - Jul 2012*

- Involved in commissioning and validation efforts of newly-built biologics manufacturing plant.
- Led 5-membered team to validate cleaning and sterilization processes as well as performance qualification of new equipment such as reactor tank, storage tank, transfer lines, filtration and chromatography skids.
- Led Good Manufacturing Practice (GMP) readiness exercise of downstream purification production suites ensuring timely availability of production suites for routine GMP manufacturing operation.
- Integrated process requirement and the necessary validation from customers' master plan to on-site capability.
- Wrote standard operating procedures, validation protocols and reports for new equipment and process.
- Trained new technicians on equipment operation and daily manufacturing activities.

Bioprocess Engineering Intern – Bioprocessing Technology Institute, SG *Jul 2009 - Dec 2009*

- Performed bioreactor operations, downstream protein purification and analytical techniques for protein quantification.
- Learned aspects of Good Manufacturing Practice.

Research Intern – Institute of Bioengineering and Nanotechnology, SG *May – Aug 2007 & Jan - Aug 2008*

- Designed and synthesized biodegradable polymers for drugs and gene delivery.
- Performed study on structure-property relationship of polyamidoamine for gene delivery.
- Performed performance evaluation of cationic polymer in biological systems such as gene transfection, cellular toxicity and intracellular trafficking.
- Communicated results in 2 journal publications and 2 conference proceedings.

TEACHING EXPERIENCE AT NORTHWESTERN UNIVERSITY (as teaching assistant)

1. ChE 361: Introduction to Polymers *Fall 2014 & Fall 2015*
 - Prepared homework solutions, tutored students and graded homework.
2. ChE 342: Chemical Engineering Laboratory *Winter 2014*
 - Instructed students on operation of analytical equipment.
 - Provided assistance on execution of fundamental chemical engineering experiments such as distillation, glucose conversion, heat exchange in stirred tank, heat exchanger, etc.
3. MBP 402: Bioprocess Engineering Laboratory *Spring 2013*
 - Instructed students on set up and operation of stirred tank bioreactor, chromatography column and tangential flow filtration.
 - Prepared buffer solutions and cell culture media for laboratory use.

ORGANIZATIONAL EXPERIENCE

1. Member of Lonza Emergency Response Team (2010-2012)
2. Academic and Welfare Subcommittee of School of Chemical and Biomedical Engineering Club (2007-2008)
3. Executive Committee of Indonesian Student Christian Fellowship (2007-2008)
4. Vice-Chairman of NTU Students Union International Culture and Food Festival (2006-2007)
5. Program Director of NTU Students Union International Culture and Food Festival (2005-2006)
6. Chairperson of Indonesian Student Christian Fellowship leadership camp committee (2006)
7. Chairperson of high school student council (2003-2004)

REFERENCES

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Dept. of Materials Science and Engineering
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