ENTAO YANG

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EDUCATION

University of Pennsylvania   Philadelphia, PA

Ph.D. Candidate, major in Chemical & Biomolecular Engineering   Degree Expected May.2022

Master of Science in Engineering, major in Chemical & Biomolecular Engineering   Sep.2016-May.2018

- GPA: 3.82/4.00

Tianjin University   Tianjin, China

Bachelor of Engineering, major in Chemical Engineering   Sep.2012-Jul.2016

- GPA: 3.79/4.00
- Thesis: Effect of dust dispersion on particle integrity and explosion hazards

Nankai University   Tianjin, China

Dual Bachelor of Economics, major in Finance   Jan.2014-Jun.2016

- Thesis: Effects of Two-child policy on Chinese saving rate

RESEARCH EXPERIENCE

Graduate Researcher at University of Pennsylvania, P.I. Prof. Robert A. Riggleman   Feb.2017-Present

- Model the aging process of nanoparticle's (NP) bound layer in polymer solution and evaluate the effect of NP sizes, interaction strength, and polymer chain length.

- Develop the 3D version of Structuro-elasto-plasticity (StEP) model incorporating thermal contributions, which can model shear banding and brittle-to-ductile transition in tensile-deformed amorphous solids (polymer nanopillars) at different temperatures.

- Build up a Structure-dependent Eyring Model (StEM) using machine learning, connecting the activation volume in the original Eyring model, to a polymer structure property (softness) for the first time.

- Use StEM to prove the glassy dynamical enhancement due to external stress is heterogenous, which explains the narrower relaxation time distribution observed in both experiments and simulations.

- Collaborate with industry partners and investigate the effect of NP size, dispersion state, and polymer-NP interactions on polymer nanocomposites (PNCs) creep suppression through molecular dynamics simulation, qualitatively agreeing with the collaborating experimental studies.

- Develop a Dynamical Decomposition Model in PNCs using machine learning, which can predict the critical time of PNCs' linear response limit under creep deformation from the structural information of pre-deformation samples.

- Develop a transfer-learned softness (a machine-learned field) which connects softness in the heterogenous system to the well-dispersed system for the first time and enable training on small scale (5-10%) data sets.

- Study effect of NP attractive strength on strain localization position in tensile-deformed polymer nanopillars and connect it to a machine-learned microscopic structural property, softness.

Research Intern at Mary Kay O'Connor Process Safety Center, Texas A&M University   Jan.2016-May.2016

- Quantified the effect of dust dispersion mechanism and dust concentration on dust particle breakage and evaluated the potential hazards of dust explosion.

- Presented a poster about dust explosion on a safety symposium held by ExxonMobil in Houston.

Research Assistant at Green Chemical Technology Laboratory, Tianjin University   Feb.2015-Nov.2015

- Worked on developing high efficiency carbon capture membrane. Achieved 5.2 times higher CO_2 permeation rate and 6.5 times higher CO_2/CH_4 compared with pristine membrane by applying surface segregation to the preparation of asymmetric membranes.

Research Assistant at Tianjin University-Astrazeneca Joint Laboratory   Nov.2013-Feb.2015

- Collaborated with Shanghai Baosteel Ltd. and investigated the refinement of β-methylnaphthalene from coal tar. Increased the purity of β-methylnaphthalene from 70% to 97.8% and removed the main impurity indole.

PROFESSIONAL SKILLS

- Mathematical modeling and data modeling: develop three physical models (StEM, StEP model, and Dynamical Decomposition Model in PNCs) and one algorithm (transfer-learned softness).
- Molecular Dynamics Simulation: LAMMPS.
- Coding language: C++, Python, Matlab.
- Interpretable machine learning and transfer learning algorithm: Support Vector Machine, Logistic Regression, Clustering, TrAdaboost, etc.

OTHER EXPERIENCE

Co-chair of 12th Penn CBE Graduate Student Symposium   Jan.2021-Present

- Prepare for the symposium organization including schedule design, advertising and regular communication.

Co-founder of Penn Graduate Poker Group   Mar.2019-Present

- Organize monthly live poker tournament (Texas hold 'em) involving faculty members and graduate students at University of Pennsylvania. Event has been moved to online after pandemic.

PUBLICATIONS

- **Yang, E**., & Riggleman, R. A. (2021). How to Relax Under Stress: Structure-dependent Eyring model (StEM) in polymer glass. *Manuscript in preparation*.
- **Yang, E**., Pressly, J., Natarajan, B., Winey, K., & Riggleman, R. A. (2021). Dynamical decomposition in model polymer nanocomposites under creep. *Manuscript in preparation*.
- **Yang, E**., Pressly, J., Natarajan, B., Winey, K., & Riggleman, R. A. (2021). Suppression of creep in model polymer nanocomposites. *Manuscript in preparation*.
- **Yang, E**., Ivancic, R. J., Lin, E. Y., & Riggleman, R. A. (2020). Effect of polymer-nanoparticle interaction on strain localization in polymer nanopillars. *Soft matter*, 16(37), 8639-8646.
- Bagaria, P., Zhang, J., **Yang, E.**, Dastidar, A., & Mashuga, C. (2016). Effect of dust dispersion on particle integrity and explosion hazards. *Journal of Loss Prevention in the Process Industries*, 44, 424-432.
- Tong, Y., Wang, Z., **Yang, E.**, Pan, B., Dang, L., & Wei, H. (2016). Insights into Cocrystal Polymorphic Transformation Mechanism of Ethenzamide–Saccharin: A Combined Experimental and Simulative Study. *Crystal Growth & Design*, 16(9), 5118-5126.
- Tong, Y., Wang, Z., **Yang, E.**, Pan, B., Jiang, J., Dang, L., & Wei, H. (2016). Determination and correlation of solubility and solution thermodynamics of ethenzamide in different pure solvents. *Fluid Phase Equilibria*, 427, 549-556.
- Feng, Y., **Yang, E.**, Dang, L., & Wei, H. (2015). Liquid–liquid phase equilibrium for ternary mixtures of formamide (or ethylene glycol, or monoethanolamine)+indole+2-methylnaphthalene at 308.15 K. *Fluid Phase Equilibria*, 398, 10-14.

CONFERENCES

- **Yang, E**., Pressly, J., Natarajan, B., Winey, K., & Riggleman, R. (2021). Dynamical decomposition in model polymer nanocomposites under Creep. *American Physical Society March Meeting*.
- Pressly, J., **Yang, E**., Bailey, E., Denby, T., Natarajan, B., Winey, K., & Riggleman, R. (2021). Effect of polymer-nanoparticle interaction strength on viscoelastic creep attenuation in polymer nanocomposites. *American Physical Society March Meeting*.
- Zhang, G., Xiao, H., Ivancic, R., **Yang, E.**, Riggleman, R., Durian, D., & Liu, A. (2021). Structuro-elasto-plasticity (StEP) model for plasticity in disordered solids. *American Physical Society March Meeting*.
- Xiao, H., Zhang, G., Ivancic, R., **Yang, E.**, Riggleman, R., Durian, D., & Liu, A. (2021). Modeling shear band formation in amorphous solids using a structuro-elasto-plasticity (StEP) model. *American Physical Society March Meeting*.
- **Yang, E**., Pressly, J., Bailey, E., Natarajan, B., Mohan, A., Winey, K., & Riggleman, R. A. (2020). Suppression of creep in model polymer nanocomposites. *American Physical Society March Meeting*.

MODEL & ALGORITHM

- Structuro-elasto-plasticity (StEP) model, Structure-dependent Eyring Model (StEM), Dynamical Decomposition Model in PNCs, and transfer-learned softness.