

Yinan Lu

Department of Mechanical Engineering
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EDUCATION

- **Ph.D.** Mechanical Engineering, University of Colorado at Boulder 2017-present
Research focus: Fracture and damage of soft elastomers and composites.
Advisor: Rong Long
- **M.S.** Mechanical Engineering, University of Colorado at Boulder 2015-2017
Research focus: Damage mechanics of elastomeric syntactic foam.
Advisor: Rong Long
- **M.S.** Mechanical Engineering, Hong Kong University of Science and Technology 2014-2015
- **B.S.** Mechanical Engineering, Beihang University, Beijing, China 2010-2014

TECHENICAL SKILLS

- Experimental: Test Setup Design/Manufactory (Machining, 3D printing), Mechanical Testing Systems (Instron or MTS)
- Computational Programs: Abaqus, AutoCAD, Solidworks, MATLAB, Python.

EXPERIENCES

- Research Assistant, Department of Mechanical Engineering, CU Boulder 2016-present
 - *Project:* Mixed-mode fracture of soft elastomers.
Developed an experimental setup to measure the fracture toughness of soft elastomers under mixed Mode-I and Mode-II loadings. Applied a particle tracking method to map the deformation field around the mixed-mode crack tip.
 - *Project:* Crack-inclusion interaction
The interaction between matrix crack and a round inclusion was studied by the method of particle tracking. This method can experimentally evaluate the energy release rates associated with crack tip extension while the inclusion is stationary. These results will play an important role for evaluating the fracture mechanism of crack-inclusion interaction in composites.
 - *Project:* Failure of micrometer-sized spherical glass shell embedded in silicone elastomer.
Developed an indentation experiment to measure the force required to fail individual glass micro-balloons that are either embedded in an elastomer matrix or adhered on top of an elastomer surface. Established an experimental apparatus to allow *in situ* imaging of the failure process through an optical microscope and associated finite element model. This project was in collaboration with Sandia National Laboratories.
 - *Project:* Enhancing the toughness of composites via dynamic thiol-thioester exchange (TTE) at the resin-filler interface.

Designed a fracture test to study how TTE affects the deformation of a pre-existing crack before it starts to propagate. Applied digital image correlation (DIC) method to map the strain fields for TTE-active composites. This project was in collaboration with chemical department.

- *Project*: Material properties characterization for pressure sensitive adhesives
Designed different experimental configurations to characterize the material's properties for pressure sensitive adhesives provided by Avery Dennison.
- Teaching Assistant, Department of Mechanical Engineering, CU Boulder 2017-2018
 - *Course*: MCEN 2043 Dynamics, Fall 2017
This course introduces methods and concepts to analyze the dynamics of particles and rigid bodies.
 - *Course*: MCEN 2063 Mechanics of Solids, Spring 2018
This course introduces covers the analysis of stress and strain in solids and various engineering structures.
- Intern, Western Digital, Milpitas, CA, US 2020
 - Investigated different failure mechanics of solder joint under thermal cycling tests. Reviewed several creep-fatigue models of solder-joint fatigue life prediction and established a framework to predict solder-joint fatigue life under wider temperature range.
- Intern, Shenyang Aircraft Factory, Liaoning, China 2013
 - Visited the factory. Observed various manufacturing processes and analyzed the processes by applying theories learned in the textbook. Worked on a variety of practice projects.
- Draftsman/assistant, Water Conservancy Bureau, Kashgar, Xinjiang, China 2013
 - Worked with local technicians on a water dam project. Drew three dimensional technical illustrations of a sluice gate based on draft provided, which saved time for field engineers and government inspectors.

JOURNAL PUBLICATIONS

- **Yinan Lu**, Jay Carroll, Kevin Long, Rong Long, 2019, "Failure of brittle micro-spherical shells embedded in elastomer matrix under indentation", *Composites Part B*, **173**, 106-870.
- **Yinan Lu**, Yuan Qi, Michely Tenardi, Rong Long, 2020, "Mixed-Mode fracture in a soft elastomer", *Physical Review Letters*. (ready to submit)
- Nancy Sowan, **Yinan Lu**, Kevin J. Kolb, Lewis M. Cox, Rong Long, Christopher N. Bowman, 2020 "Enhancing the Toughness of Composites via Dynamic Thiol-Thioester Exchange (TTE) at the Resin-Filler Interface." *Polym. Chem.*, **11**, 4760-4767.

CONFERENCES PRESENTATIONS

- "Mixed-mode fracture in a soft elastomer". *Gordon Research Conference on Adhesion Science*, South Hadley, MA, July 21-26, 2019 (Poster).
- "Failure of micrometer-sized spherical glass shell embedded in silicone elastomer". *The 18th U.S. National Congress on Theoretical and Applied Mechanics*, Chicago, IL, USA, June 5-9, 2018 (Oral).
- Attendees. *2020 IEEE Electronic Components and Technology Conference*, June 3-July 7, 2020.

HONORS & AWARDS

- Summer Fellowship Award in University of Colorado at Boulder, 2019
- Outstanding Graduate Award in Hong Kong University of Science and Technology, 2015
- Outstanding Graduate Award in Beihang University, 2014
- Outstanding Student Award in Beihang University, 2013