Ange-Therese Akono
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Assistant Professor
Department of Civil and Environmental Engineering
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EDUCATIONAL PREPARATION

Ph. D. in Civil and Environmental Engineering, Massachusetts Institute of Technology (Cambridge, MA, USA),	2013
M. Sc. in Civil and Environmental Engineering, Massachusetts Institute of Technology (Cambridge, MA, USA),	2011
Diplome d'Ingenieur Polytechnicien, Ecole Polytechnique (Palaiseau, France),	2011
M. Sc. in Materials Design and Mechanics of Materials, Ecole Polytechnique, (Palaiseau, France),	2009

PROFESSIONAL EXPERIENCE

Affiliate Faculty, Department of Mechanical Engineering, **Northwestern University**, IL, USA	Feb 2018 - Present
Assistant Professor, Department of Civil and Environmental Engineering, **Northwestern University**, IL, USA	Sep 2017- Present
Adjunct Faculty, Department of Civil and Environmental Engineering, **Northwestern University**, IL, USA	Nov 2016- Aug 2017
Faculty Fellow, National Center for Supercomputing Applications **University of Illinois at Urbana-Champaign**, IL, USA	July 2016- June 2017
Affiliate Faculty, Department of Mechanical Science and Engineering, **University of Illinois at Urbana-Champaign**, IL, USA	Aug 2015-Aug 2017
Assistant Professor, Department of Civil and Environmental Engineering, **University of Illinois at Urbana-Champaign**, IL, USA	Aug 2014-Aug 2017
Visiting Professor, Department of Civil and Environmental Engineering, **University of Illinois at Urbana-Champaign**, IL, USA	Dec 2013-May 2014
Research Assistant, Department of Civil and Environmental Engineering, **Massachusetts Institute of Technology**, MA, USA	Sep 2009- Nov 2013

HONORS AND AWARDS

Northwestern University Education Technology Teaching Fellowship	Oct 2017
Keynote Speaker, Introduction to Graduate Education at Northwestern University (IGEN)	Sep 2017

National Center for Supercomputing Applications Fellowship	April 2016
Nomination for 2016 DiscoverE New Faces of Engineering, American Society of Civil Engineers	Mar 2016
New Faces of Civil Engineering- Professionals, American Society of Civil Engineers	Feb 2016
Collins Scholar Award 2014-2015, College of Engineering--- Academy for Excellence in Engineering Education, University of Illinois at Urbana-Champaign, USA	May 2015
Certificate of Appreciation, Department of Civil and Environmental Engineering at Howard University, USA	Sep 2013
Total-MIT Energy Initiative Fellowship, Massachusetts Institute of Technology, USA	April 2009
EGIDE Excellence Scholarship, Egide, France	April 2009
Fondation de l'Ecole Polytechnique Excellence Fellowship, Ecole Polytechnique, France	April 2007
President's Award for Educational Excellence, Ministry of National Education, Cameroon,	Nov 2004

RESEARCH --- PUBLICATIONS

Peer Reviewed Journal Articles ---- Published

22. **Ange-Therese Akono**, Pooyan Kabir, Zhuofan Shi, Samantha Fuchs, Theodore Tsotsis, Kristian Jessen, Charles J Werth, Modeling CO_2-Induced Alterations in Mt. Simon Sandstone via Nanomechanics, *Rock Mechanics and Rock Engineering*, In Press.
21. **Ange-Therese Akono**, Pooyan Kabir, Influence of Geochemistry on Toughening Behavior of Organic-Rich Shale, *Acta Geotecnica*, https://doi.org/10.1007/s11440-018-0715-9, (2018).
20. **Ange-Therese Akono,** Jiaxin Chen, S. Kaewunruen, Friction and Fracture Characteristics of Engineered Crumb-Rubber Concrete at Microscopic Lengthscale, *Journal of Construction and Building* Materials, Vol. 30, pp. 735-745, (2018).
19. **Ange-Therese Akono**, Yue Cui,Amrita Kataruka, Kevin Anderson, Pooyan Kabir, Intrinsic Mechanical Properties of Calcium Aluminate Crystals via the Linear Comparison Composite Method coupled with Nano-Indentation, *Mechanics of Materials*, Vol. 118, pp. 74-84, (2018).
18. Kevin Anderson, **Ange-Therese Akono**, Microstructure-Toughness Relationships in Calcium Aluminate Cement/Polymer Composites using Instrumented Scratch Testing, *Journal of Materials Science*, Vol. 52, pp. 13120-13132, (2017).
17. Kavya Mendu, Amrita Kataruka, Jasmine Puthuvelil, **Ange-Therese Akono**, Fragility Assessment of Bovine Cortical Bone Using Scratch Tests, *Journal of Visualized Experiments*, DOI: 10.3791/56488, (2017).
16. Pooyan Kabir, Franz-Josef Ulm, **Ange-Therese Akono**, Rate-Independent Fracture Toughness of Grey and Black Kerogen-Rich Shales, *Acta Geotecnica*, Vol. 12, pp. 1207-1227, (2017).

15. **Ange-Therese Akono**, Franz-Josef Ulm, Microscopic Toughness of Viscous Solids via Scratching: From Amorphous Polymers to Gas Shale, *Journal of Nanomechanics and Micromechanics*, , DOI: https://doi.org/10.1061/(ASCE)NM.2153-5477.0000131,(2017).
14. **Ange-Therese Akono**, Letter to the Editor Reply to "Discussion on the Fracture mechanics interpretation of the scratch test by Akono *et al.*", *Engineering Fracture Mechanics*, Vol. 178, pp. 14-21, (2017)
13. Caroline V. Johnson, Jiaxin Chen, Nicole P. Hasparyk, Paulo J. M. Monteiro, **Ange-Therese Akono**, Fracture properties of the alkali silicate gel using microscopic scratch testing, *Cement and Concrete Composites*, Vol. 79, pp. 71-75, (2017)
12. Amrita Kataruka, Orieka Okeoghene, Jasmine Puthuvelil, **Ange-Therese Akono**, Microscopic assessment of bone toughness using scratch tests, *Bone Reports*, Vol. 6, pp. 17-25, (2017)
11. Gregory Bouche, **Ange-Therese Akono**, Shallow and Deep Scratch Tests as Powerful Alternatives to Assess the Fracture Properties of Quasi-Brittle Materials, *Engineering Fracture Mechanics*, Vol. 158, pp. 23-38, (2016).
10. **Ange-Therese Akono**, Pooyan Kabir, Microscopic Fracture Characterization of Gas Shale via Scratch Testing, *Mechanics Research Communications*, (2016), Vol. 78, part B, pp. 86-92.
9. **Ange-Therese Akono**, Energetic Size Effect Law at the Microscopic Scale: Application to Progressive-load Scratch Testing, *ASCE's Journal of Nanomechanics and Micromechanics*,(2016), DOI: 10.1061/(ASCE)NM.2153-5477.0000105.
8. G. A. Bouche, **A.-T. Akono**, Micromechanics-based Lower Bounds on the Macroscopic Fracture Toughness of Micro-Particulate Composites, *Engineering Fracture Mechanics*, Vol. 148, pp. 243-257 (2015).
7. K. J. Krakowiak, J. J. Thomas, S. Musso, S. James, **A.-T. Akono**, F.-J. Ulm, Nano-chemo-mechanical Signature of Conventional Oil-well Cement Systems: Effects of Elevated Temperature and Curing Time, *Cement Concrete Research*, Vol. 67, pp. 103-121, (2015).
6. **A.-T Akono**, F.-J. Ulm, Z. P. Bazant, Discussion: Strength-to-fracture scaling in scratching, *Engineering Fracture Mechanics*, Vol. 119, pp. 21-28, (2014).
5. **Ange-Therese Akono**, Franz-Josef Ulm, An improved technique for characterizing the fracture toughness via scratch test experiments, *Wear*, Vol. 313, pp. 117-124, (2014).
4. **Ange-Therese Akono**, Franz-Josef Ulm, Fracture scaling relations of axisymmetric shape, *Journal of the Mechanics and Physics of Solid*s, Vol. 60, pages 379-390, (2012).
3. **Ange-Therese Akono**, Nicholas X. Randall, Franz-Josef Ulm, Experimental determination of the fracture toughness via micro scratch tests: application to polymers, ceramics and metals, *Journal of Materials Research*, Vol. 27, pp. 485-493, (2012).
2. **A.-T. Akono**, P. M. Miguel and F.-J. Ulm, Scratching as a Fracture Process: From Butter to Steel, *Physical Review Letters*, Vol.106, pp. 204302, (2011).
1. **Ange-Therese Akono**, Franz-Josef Ulm, Scratch test model for the determination of fracture toughness, *Engineering Fracture Mechanics*, Vol. 78, pp. 334-342, (2011).

Referenced Conference Proceedings

5. Kabir Pooyan**, Ange-Therese Akono,** Fluid-Rock Reactions in Mt. Simon Sandstone at Microscopic Length-Scale, ARMA 18–219, American Rock Mechanics Association, 52nd

meeting, Seattle, June 2018

4. **Akono, Ange-Therese**; "From Butter to Bone Tissues: Assessing the Fracture Resistance via Scratch Testing", p. 96 . In: Proceedings of the 13th International Symposium on Multiscale, Multifunctional and Functionally Graded Materials [Blucher Material Science Proceedings, v.1, n.1]. São Paulo: Blucher, 2014. ISSN 2358-9337.
3. **Akono, A.-T.**, & Ulm, F. (2014). Rate-dependent toughness in soft materials via microscopic scratch testing. In A. Bajaj, P. Zavattieri, M. Koslowski, & T. Siegmund (Eds.). Proceedings of the Society of Engineering Science 51st Annual Technical Meeting, October 1-3, 2014, West Lafayette: Purdue University Libraries Scholarly Publishing Services, (2014).
2. **Akono, Ange-Therese**; Reis, Pedro Miguel; Randall, Nicholas Xavier; Ulm, Franz-Josef, Scratch test as a fracture process: from soft to hard materials, American Physical Society, APS March Meeting 2012 Proceedings, February 27-March 2, (2012).
1. Jeffrey Thomas, Simon James, J. Alberto Ortega, Simone Musso, Francois Auzerais, Konrad Krakowiak, **Ange-Therese Akono**, Franz-Joseph Ulm, Roland Pellenq, , Fundamental Investigation of the Chemical and Mechanical Properties of High-Temperature Cured Oil-Well Cements, Offshore Technology Conference, 30 April-3 May, Houston, Texas, USA, (2012).

Chapters in Books

2. Pooyan Kabir, **Ange-Therese Akono**, Nano-Scale Characterization of Organic-Rich Shale Via Indentation Methods, New frontiers in Oil and Gas Exploration, edited by Congrui Jin, and Gianluca Cusatis, (Springer), (2016).
1. F.-J. Ulm, **A.-T. Akono**, R. J.-M. Pellenq, Fracture Toughness Bottom-Up: Experiments and Simulations, in Mechancis and Physics of porous Solids: a tribute to Pr. Olivier Coussy, Symposium on Mechanics and Physics of Porous Solids, Edited by the organizing committee, (2011), ISBN: 978-2-7208-2593-4

RESEARCH ---- PPROJECTS

Research Grants

Acquisition of a digital x-ray imaging system, PI: John Popovics, Co-PI: Cassandra Rutherford, **Ange-Therese Akono**. Illinois Office of Vice Chancellor for Research Special Program Equipment fund, University of Illinois College of Engineering. September 2014.

Dynamic scratch resistance of micro- and nano-engineered concrete for sustainable and environmental-friendly applications in railway and other civil construction, PI: Sakdirat Kaewunruen, Co-PI: **Ange-Therese Akono**. BiRminghamIllinois partnership for llinois partnership for Discovery enGagement, and Education Seed Fund. May 2016-December 2016.

Multi-scale and Multi-Physics Modeling of Na-PS Geopolymer Cement Composites, PI: **Ange-Therese Akono**, co-PIs: Erman Guleryuz and Waltraud M. Kriven. National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign. July 2016-June 2017.

Multi-scale and Multi-Physics Modeling of Geopolymer Cements Composites, PI: **Ange-Therese Akono**, co-PI: Erman Guleryuz. Exploratory proposal, Illinois Blue Waters allocations, University of Illinois at Urbana-Champaign. July 2016- May 2017. 50,000 node-hours

Microseismicity and Geomechanical Modelling within the Context of CO2 subsurface capture and storage. PI: John Popovics, Co-PIs Ahmed Elbanna, **Ange-Therese Akono**, Roman Makhnenko, GSCO2 project, U. S. Department of Energy. Aug 2016-July 2018.

Strong and Multifunctional Inorganic Polysialate Composites: A Multi-Scale Study. PI: **Ange-Therese Akono**, Division of Civil Mechanical and Manufacturing Innovation, National Science Foundation. Aug 2017-July 2020.

Molecular Dynamics Modeling of the Fracture Behavior of Inorganic Polysialates, PI: Ange-Therese Akono, Northwestern University Quest Allocation, 35,000 node-hours.

STUDENT ADVISING

PhD Students

2. Jiaxin Chen, Nanomechanical studies of geopolymer materials (May 2021).
1. Pooyan Kabir, Geo-chemo-mechanical Modeling of Sedimentary Rocks: Application to Unconventional Reservoirs and Geological CO_2,PhD Defense in May 2018.

MS students

2. Okeoghene Orieka, Characterization of Compact Bone's Toughness via Statistical Nano-indentation, December 2017.
1. Gregory A. Bouche, Investigation of the fracture toughness of sphere-reinforced polymer materials via scratch testing, May 2015

Undergraduate Students

11. Anleen Cao (Class of 2018), Nanomechanical Studies of Mt Simon Sandstone for CO2 subsurface sequestration, Spring 2017
10. Matthew Figus (Class of 2017), Synthesis of Potassium-Based Geopolymer, Spring 2017
9. Yihui Dong (Class of 2018), Characterization of Wear and Abrasion Properties of Recycled Rubber-reinforced concrete, Fall 2016

8. Luis Wally Chavez Quiroz (class of 2017), FEM modelling of granite-reinforced geopolymer using OOF2, Summer 2016
7. Jasmine Puthuvelil (class of 2017), Nanoscale Characterization of Cortical Bone, Spring 2016, Fall 2016, Spring 2017
6. Kate Hawkins (class of 2016), Polishing procedures for the mechanical characterization of gas shale materials, Summer 2015
5. Suo Zhang (class of 2016), Manufacturing of organo-cements, Summer 2015
4. Esther Kolekko Bolekia Loribo, Preparation protocol of cortical bone specimens for small-scale mechanical testing, Summer 2014.
3. Ye Liu (class of 2015), Three-dimensional Schematic Representation of the Macroscopic Scratch Test Equipment, Summer 2014
2. Wenjing Li (class of 2016), Assessment of the fracture resistance of cortical bone specimens via scratch testing, Summer 2014
1. James C Myers (class of 2014), Fracture Properties of particle-reinforced paraffin wax specimens via Macroscopic Scratch Testing, Summer 2014

SERVICE AND LEADERSHIP

Membership in Professional Societies

- Network of Minority Health Research Investigators (NMRI) (2015-present)
- American Society of Civil Engineers, Affiliate Member, 2012-Present Sub-societies: Engineers Without Borders and Engineering Mechanics Institute
- American Physical Society (2012-present)
- Materials Research Society (2012-present)
- American Ceramic Society (2016-Present)

Service in Technical Societies

- American Society of Civil Engineers Rock Mechanics Committee (2016-present)
- Member, Committee member, Engineering Mechanics Institute, Modeling Inelasticity & Multiscale Behavior Committee,
- Reviewer, Journal of Nanomechanics and Micromechanics, Journal of Rock Mechanics and Rock Engineering, Engineering and Fracture Mechanics, Surface and Coatings Technology, International Journal of Solids and Structures, Society of Petroleum Engineering, Mechanics Research Communications, Mechanics of Materials, International Journal of Rock Mechanics and Mining Sciences

Conferences Organized/Co-Organized or Chaired/Co-Chaired

8. 42nd International Conference and Expo on Advanced Ceramics and Composites, Mechanical Properties, Infrastructure, and Sustainable Materials, Daytona Beach, USA, Jan 2018

7. ASCE Engineering Mechanics Institute International Meeting, Mini-symposium co-organizer, Advances in Computation, Theoretical and Experimental Fracture Mechanics, Cambridge USA, June 2018
6. 18th National Congress on Theoretical and Applied Mechanics, Mini-symposium co-organizer, Mechanics and Physics of Multi-Scale Porous Media, Northwestern University, June 2018
5. ASCE Engineering Mechanics Institute International Meeting, Mini-symposium co-organizer, Advances in Computation, Theoretical and Experimental Fracture Mechanics, San Diego, USA, June 2017
4. ASCE Engineering Mechanics Institute International Meeting, Mini-symposium co-organizer, Advances in Creep and Relaxation Mechanics, Metz, France, Oct 2016
3. Society of Engineering Science 53rd Meeting, Mini-symposium lead organizer, Mechanics of Inelastic Deformation and Failure in Biological Materials, Lafayette, IN, Oct 2016
2. ASCE Engineering Mechanics Institute 2016 Annual Meeting, Mini-symposium lead organizer, Advances in Experimental, Theoretical and Computational Fracture Mechanics, Vanderbilt, TN, May 2016
1. Society of Engineering Science 51st Meeting, Mini-symposium co-organizer, Fracture Processes in Biomineralized Tissues, Lafayette, IN, Oct 2014

Service at the University of Illinois at Urbana-Champaign (Urbana, IL)

- Faculty Advisor for the ASCE Engineer Without Borders student chapter, Jan 2015-2017
- Women Exploring Graduate Opportunities in CEE, Organizing Committee member, May 2015-2016
- Structures Group Qualifying Exam Committee, CEE Department, Spring 2014-2017
- Structures Group Admission Committee, CEE Department, Spring 2015

Service at Northwestern University (Evanston, IL)

- Diversity Fellowship Committee, Winter 2018
- Theoretical and Applied Mechanics Admission Committee, Winter 2018
- Mechanics Materials and Structures Admission Committee, Winter 2018

Professional and Public Lectures

Invited Lectures (30)

30. The future of Engineering Education: Practitioners and Academics, Plenary Session, 2018 Structures Congress, Panel Speaker, Fort Worth, TX, Apr 2018
29. Understanding Fracture at the Nanoscale: From Butter to CO_2 Geological Sequestration, Department of Civil and Environmental Engineering, University of Houston, Houston, TX, Apr 2018
28. Nanomechanics Study of Fluid-Rock Reactions in Mt. Simon Sandstone, US DOE Energy Frontiers Research Centers Blue Team Meeting, Jan 2018

27. Nanoscale Study of CO2-induced Geo-chemo-mechanical Alterations for Geological Carbon Sequestration: Case Study of the Illinois Basin Decatur Project, Department of Civil and Environmental Engineering, Stanford University, Palo Alto, CA, Jan 2018
26. Fracture at Small Scales, CEE Open House, Northwestern University, Evanston, IL, Jan 2018
25. Influence of Nanoporosity on Strength of Inorganic Polysialates: A Molecular Dynamics Study, 42nd International Conference and Expo on Advanced Ceramics and Composites, Daytona Beach, FL, Jan 2018
24. Strength Properties of Geopolymer Composites Using a Theoretical and Numerical Approach, 42nd International Conference and Expo on Advanced Ceramics and Composites, Daytona Beach, FL, Jan 2018
23. Elucidating Fracture in Multiscale Materials via Nanoscale Mapping, CEE External Advisory Board Meeting, Northwestern University, Evanston, IL, Nov 2017
22. Fragility of Cortical Bone via Microscopic Scratch Testing, Department of Biomedical Engineering, Northwestern University, Evanston, IL, Nov 2017
21. Graduate School - Pathway to Success and Empowerment, Introduction to Graduate Education at Northwestern University, Oct 2017
20. Upscaling the Strength Characteristics of Geopolymer Composites via Atomistic Simulations and Micromechanics Modelling, National Center for Supercomputing Applications, Urbana, IL, April 2017
19. Fluid-Rock Reactions in Mt Simon Sandstone via Scratch Testing, GSCO$_2$ Annual Review Meeting, Urbana, IL, March 2017
18. Fracture Behavior of Geopolymer Concretes at the Microscopic Length-scale, 42nd International Conference and Exposition on Advanced Ceramics and Composites, Daytona Beach, FL, January 2017
17. Hierarchically-Structured Porous Materials, Department of Civil and Environmental Engineering, Johns Hopkins University, Baltimore, MD, December 2016
16. Scratch resistance of nano-engineered crumbed rubber concrete for sustainable applications in civil construction, School of Engineering, University of Birmingham, (Birmingham, UK), July 2016
15. Multi-Physics Characterization of Reservoir rock: Microscopic to Macroscopic Scale, Illinois Prairie Institute, May 2016.
16. Nanomechanics of Hierarchically Structured Porous Materials: From Cortical Bone to Geopolymer Composites, Department of Civil and Environmental Engineering, Northwestern University, Evanston, IL Apr 2016
13. Exploration des Propriétés Mécaniques des Géo-matériaux à l'Echelle moléculaire, Laboratoire Navier, Ecole des Ponts- ParisTech (Paris, France), Nov 2015
12. Elucidating the Mechanical Resistance of Advanced Geo-composites at the Molecular Length-scale, Laboratoire de la Mecanique des Solides, Ecole Polytechnique (Palaiseau, France), Nov 2015

11. Elucidating the Mechanical Resistance of Advanced Geo-composites at the Molecular Length-scale, Department of Civil and Environmental Engineering, University of California, Los Angeles, Oct 2015
10. Multi-scale Characterization of organo-cements using Microscopic Scratch Tests and Statistical Nano-Indentation, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, Sep 2015
9. Multi-scale modeling of nano-degration and self-healing in biological and geological materials, U.S. Army Corps of Engineers Engineer Research & Development Center Construction Engineering Research Laboratory (CERL), IL, USA, May 2015
8. A Multi-scale Investigation of the Fracture Properties of Organic-inorganic Nanocomposites, Department of Civil and Environmental Engineering, Northwestern University, Evanston IL, USA, April 2015
7. As Tough As Iron: Gaining a Multi-scale Understanding of Materials Fracture Resistance, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA, USA, Oct. 2014
6. Multi-scale Toughness: Cracking the Shell of Materials Risk to Fracture, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA, Sep 2014
5. Scratch Test: a New Approach For Multiscale Characterization of Fracture Properties, Department of Civil and Environmental Engineering, Howard University, Washington, DC, Oct 2013
4. Scratch Test: a New Approach For Multiscale Characterization of Fracture Properties, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, Dec 2012
3. Scratch Test: a New Approach For Multiscale Characterization of Fracture Properties, Department of Mechanical and Civil Engineering, California Institute of Technology, Pasadena, CA, Nov 2012
2. Scratch Test: a New Approach For Multiscale Characterization of Fracture Properties, Department of Civil Engineering and Engineering Mechanics, Columbia University, New York, NY, Oct 2012
1. Scratch Test: a New Approach For Multiscale Characterization of Fracture Properties, Department of Civil and Environmental Engineering, Stanford University, Palo Alto, CA, Feb 2012

Outreach

1. Sustainability in construction materials, in collaboration with Urbana High School Tigers, Urbana, IL, July 2014
2. Strength of materials science lesson, in collaboration with Judah Christian School, Champaign, IL, Dec 2015
3. Mechanics of materials webinar, in collaboration with Intrinsic Schools, Chicago, IL, Dec 2015
4. 10^{th} grade Structural Mechanics Workshop, in collaboration with Intrinsic Schools, Chicago IL, Feb 2016

5. Girl Day, Discover Engineering in collaboration with ASCE, February 2017
6. Nanomechanics and Fun!, in collaboration with the Illinois STEM Initiative and Urbana High School, Urbana, IL, August 2017
7. Girl Science Day, Chicago Bulls College Prep, Chicago, IL, Apr 2018