

KRIS NOEL DAHL, PH.D.

Vice President



Summary

Kris Dahl joined Thornton Tomasetti in 2021 as an expert in chemical engineering process technology with specializations in advanced and composite materials, metallurgy and corrosion, biomedicine and microscopy and digital image processing. She investigates a range of chemical phenomena as well as process engineering in energy, mining, chemicals and biotechnology. Previously, she was a tenured, full professor at Carnegie Mellon University in the Department of Chemical Engineering with additional appointments in the Colleges of Engineering, Science, and Computer Science. Kris earned her Ph.D. in Chemical Engineering from the University of Pennsylvania and completed a postdoctoral appointment at the Johns Hopkins University School of Medicine. She has given nationally and internationally recognized plenary lectures and published more than 70 peer reviewed publications.

Areas of Technical Expertise

- Chemical Engineering
- Hazardous Materials
- Biomedical and Biological

Education

- Postdoctoral Fellow, Cell Biology, 2005, Johns Hopkins University
- Ph.D., Chemical and Biomolecular Engineering, 2004, University of Pennsylvania
- M.S., Chemical Engineering, 1999, University of Pennsylvania
- B.S., Chemical Engineering, 1998, Carnegie Mellon University

Professional Activities

- Researcher, Health Care Division, Procter and Gamble, 2000
- Member, American Institute of Chemical Engineers
- Member, Bio-Medical Engineering Society

Teaching

- Professor, Chemical Engineering, Carnegie Mellon University, 2006 - present

Awards

- AIMBE: American Institute for Medical and Biological Engineers induced fellow 2020
- CAREER award: NSF early career award 2010
- Ruth L. Kirschstein National Research Service Award: NIH Post-doctoral research fellowship
- Whitaker Fellowship: Graduate research fellowship for biotechnology research

Select Project Experience

Process Sustainability Analysis

Bioprocess Life Cycle Analysis. Comparison of material, waste, water and energy usage of disparate bioprocesses for sustainability comparison.

Root Cause Analysis

Arecibo Telescope Demantlement, Phase II, Arecibo, PR. Metallurgical analysis and development of modeled and analytical mechanical failure mechanisms.

Residential Construction, New York, NY. Mold and corrosion analysis to determine water ingress.

Fire Investigation, TX. Water incursion and damage assessment at industrial battery installation.

Insurance

Sleepy Hollow Residences, Sleepy Hollow, NY. Advanced data analytics and mold analysis.

Litigation

Confidential Utility, regarding investigation of material, chemistry and corrosion, and associated expert support.

Select Papers, Lectures and Publications

"A Single Stiffened Nucleus Alters Cell Dynamics and Coherence in a Monolayer," Cytoskeleton in Press, 2021 (co-author)

"Osmotic Gradients in Epithelial Acini Increase Mechanical Tension Across E-cadherin, Drive Morphogenesis, and Maintain Homeostasis," Current Biology 30, 1-10, 2020 (co-author)

"All Spectrin Stabilizes Stress Fibers and Actin-membrane Interactions," Cellular and Molecular Bioengineering 4(1):106-115, 201, co-author. and Engineering 6, 1, 367-374, 2020 (co-author)

*Denotes work performed with previous employer.

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"Piperazine Derivatives Enhance Epithelial Cell Monolayer Permeability by Increased Cell Force," ACS Biomaterials Science and Engineering 6, 1, 367–374, 2020 (co-author)

"Cells with Higher Cortical Membrane Tension are More Sensitive to Lysis by Biosurfactant Di-rhamnolipids," ACS Biomaterials Science and Engineering 6, 1, 352–357, 2020 (co-author)

"Lamin Microaggregates Lead to Altered Mechanotransmission in Progerin-expressing Cells Nucleus," 11(1):194-204, 2020 (co-author)

"Heterochromatin-driven Nuclear Softening Protects the Genome Against Mechanical Stress-induced Damage," Cell 181(4):800-817, 2020 (co-author)

"A Concentric Model Predicts District Roles for the A and B Type Lamins in the Spatial Organization and Stability of the Nuclear Lamina," Proceedings of the National Academy of Science USA 116 (10) 4307-4315, 2019 (co-author)

"Quantifying Site-specific Chromatin Mechanics and DNA Damage Response," Scientific Reports 8(1):18084, 2018 (co-author)

"SIRT6 Facilitates Directional Telomere Movement Upon Oxidative Damage," Scientific Reports 8(1):5407, 2018 (co-author)

"Determining Mechanical Features of Modulated Epithelial Monolayers Using Subnuclear Particle Tracking," Journal of Cell Science 131(12), 2018 (co-author)

"SSRP1 Cooperates with PARP and XRCC1, Facilitating Single Strand Break Repair through Chromatin Priming," Cancer Research 77(10):2674-2685, 2017 (co-author)

"Dispersed Single Wall Carbon Nanotubes Do Not Impact Mitochondria Structure or Function, but Technical Issues During Analysis Could Yield Incorrect Results," Journal of Materials Chemistry B 5: 369-374, 2017 (co-author)

"Length-dependent Intracellular Bundling of Single-wall Carbon Nanotubes Influences Retention," Journal of Materials Chemistry B, 5: 6657-6665, 2017 (co-author)

"Nuclear Mechanical Resilience But Not Stiffness is Modulated By All-spectrin," Journal of Biomechanics 49(16):3983-3989, 2016 (co-author)

"Spatially Resolved Quantification of Chromatin Condensation Through Differential Local Rheology in Cell Nuclei Fluorescence Lifetime Imaging," PLoS One 11(1):e0146244, 2016 (co-author)

"Enhanced Intracellular Delivery of Small Molecules and Drugs via Non-covalent Ternary Dispersions of Single Wall Carbon Nanotubes," Journal of Materials Chemistry B 4: 1324-1330, 2016 (co-author)

"Delivering Single-walled Carbon Nanotubes to the Nucleus Using Engineered Nuclear Protein Domains," ACS Applied Materials & Interfaces 8(5):3524-34, 2016 (co-author)

"Early Passage Dependence of Mesenchymal Stem Cell Mechanics Influences Cellular Invasion and Migration," Annals of Biomedical Engineering 44(7):2123-3, 2015 (co-author)

"Differential Sub-cellular Processing of Single-wall Carbon Nanotubes via Interfacial Modifications," Journal of Materials Chemistry B 3:6274-84, 2015 (co-author)

"Sub-cellular Partitioning and Analysis of Gd³⁺-loaded Ultra-short Single-walled Carbon Nanotubes," ACS Applied Materials & Interfaces 7(27):14593-602, 2015 (co-author)

"Developing Xenopus Embryos Recover By Compacting and Expelling Single-wall Carbon Nanotubes," Journal of Applied Toxicology 36(4):579-85, 2015 (co-author)

"Distribution of Single-wall Carbon Nanotubes in the Xenopus Laevis Embryo After Microinjection," Journal of Applied Toxicology 36(4):568-78, 2015 (co-author)

"Nuclear Stiffening and Chromatin Softening with Progerin Expression Leads to an Attenuated Nuclear Response to Force," Soft Matter 11(32):6412-8, 2015 (co-author)

"The Tail Domain of Lamin B1 is More Strongly Modulated By Divalent Cations Than Lamin A," Nucleus 6(3):203-1, 2015 (co-author)

"Mechanical Coupling of the Endothelial Cytoskeleton and Nucleus with VEGF Stimulation," BioCellular and Molecular Bioengineering 7(2): 225-230, 2014 (co-author)

"Interfacial Binding and Aggregation of Lamin A Tail Domains Associated with Hutchinson-Gilford Progeria Syndrome," Biophysical Chemistry 195:43-8, 2014 (co-author)

"Active Cytoskeletal Force and Chromatin Condensation Independently Modulate Intranuclear Network Fluctuations," Integrative Biology 6: 523-531, 2014 (co-author)

"Nuclear Stiffening Inhibits Migration of Invasive Melanoma Cells," Cellular and Molecular Bioengineering 7(4):544-551, 2014 (co-author)

"Actin Reorganization Through Dynamic Interactions with Single-wall Carbon Nanotubes," ACS Nano 8(1): 188-97, 2014 (co-author)

"Calcium Causes a Conformational Change in Lamin A Tail Domain that Promotes Farnesyl-Mediated Membrane Association," Biophysical Journal 104(10):2246-53, 2013 (co-author)

"Force Induced Changes in Subnuclear Movement and Rheology," Biophysical Journal 103 (12): 2423-31, 2013 (co-author)

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"Mechanical Characterization of Adult Stem Cells From Bone Marrow and Perivascular Niches," *Journal of Biomechanics* 45(7):1280-7, 2012 (co-author)

"Modeling Nuclear Blebs in a Nucleoskeleton of Independent Filament Networks," *Cellular and Molecular Bioengineering* 5(1):73-81, 2012 (co-author)

"Decoding Membrane- Versus Receptor-mediated Delivery of Single-walled Carbon Nanotubes into Macrophages Using Modifications of Nanotube Surface Coatings and Cell Activity," *Soft Matter* 9: 758-764, 2012 (co-author)

"Not All Protein-mediated Single-wall Carbon Nanotube Dispersions are Equally Bioactive," *Nanoscale* 4(23): 7425-34, 2012 (co-author)

"Single Wall Carbon Nanotube Uptake into Cells By Endocytosis Not Membrane Penetration," *Journal of Nanobiotechnology* 9:45, 2012 (co-author)

"Cells Take Up and Recover From Protein-stabilized Single-wall Carbon Nanotubes with Two Distinct Rates," *ACS Nano* 6(4):3481-90, 2012 (co-author)

"Altered Cell Mechanics From the Inside: Dispersed Single Wall Carbon Nanotubes Integrate with and Restructure Actin," *Journal of Functional Biomaterials* 3(20): 298-417, 2012 (co-author)

"Multi-space Computational Image Analysis of Nuclear Morphology Associated with Various Nuclear-specific Aging Disorders," *Nucleus* 2(6):570-9, 2011 (co-author)

"Quantification of Uptake and Localization of Bovine Serum Albumin-stabilized Single-wall Carbon Nanotubes in Different Human Cell Types," *Small* 7(16): 2348-55, 2011(co-author)

"Structure and Stability of the Lamin A Tail Domain and HGPS Mutant," *Journal of Structural Biology* 175(3): 425-33, 2011 (co-author)

CONTACT

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