Adam T. Melvin

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EDUCATION

University of Arizona	Chemical Engineering	BS, 2004
University of Arizona	Chemistry	BA, 2004
North Carolina State University	Chemical Engineering	MS, 2006
North Carolina State University	Chemical Engineering	PhD, 2010

PROFESSIONAL EXPERIENCE

2013-present	Assistant Professor, Cain Department of Engineering, Louisiana State University
2010-2013	Postdoctoral Fellow, Departments of Chemistry and Biomedical Engineering, University of North Carolina
2007	Intern, Systems Biology Group, Research Technology Center, Pfizer
2003	REU student, Chemical Engineering, University of South Carolina
2002	REU student, Institute for Systems Research, University of Maryland

HONORS AND AWARDS

2015-present	NIH Early Career Reviewer Program
2011-2013	NIH National Research Service Award (F32), National Cancer Institute (NCI)
2012	Ubiquitin Drug Discovery and Diagnostics Conference Travel Award
2008	ASEE Graduate Studies Division Best Student Paper
2005-2007	NIH/NCSU Molecular Biotechnology Training Program Fellowship
2005 & 2006	North Carolina State University Outstanding Teaching Assistant
2005	NCSU Department of Chemical and Biomolecular Engineering T.A of the Year
2004-2005	NCSU College of Engineering First-Year Graduate Student Fellowship

RESEARCH INTERESTS

My research group aims to develop new tools and technologies to quantify and characterize complex biological systems. We take an interdisciplinary approach combining elements chemical and biomedical engineering with chemical biology, biochemistry, biophysics, cell biology, and cancer biology. Current research areas include point of care diagnostics, biochemical analysis of the ubiquitin proteasome system (UPS), alternative materials for microfluidic devices, harmful algal blooms (HABs), and single cell and population-based studies of algal growth and migration.

RESEARCH GRANTS AWARDED

(1) "REU Site: Energy Innovations: Developing entrepreneurs in energy storage, catalysis, and biofuels" (PI: Michael Benton, co-PI: Adam Melvin); $330,759; National Science Foundation-EEC-ENG 1560305; (May 2016 – April 2019)
(2) "Ex vivo analysis of deubiquitinating enzyme activity single multiple myeloma cells" (PI: Adam Melvin); $140,080; National Institutes of Health-NIBIB; 07/2015 – 06/2017
(3) "Direct measurement of DUB activity in intact single cells using a droplet microfluidic array" (PI: Adam Melvin); $313,643; National Science Foundation-CBET; 06/2015 – 06/2018

(4) "Ex vivo analysis of deubiquitinating enzyme activity in single myeloma cells" (PI: Adam Melvin); $33,000; Innovation in Engineering Research Fund (FIER) Round VII, LSU College of Engineering; 08/2015 - 07/2016
(5) "A microfluidic droplet array for dynamic analysis of enzyme activity in intact single cells" (PI: Adam Melvin, Student: Seleipiri Charles); $4,500; Supervised Undergraduate Research Experience (SURE), Louisiana Experimental Program to Stimulate Competitive Research (LA EPSCoR), 01/2015 – 12/2015
(6) "Harmful algal bloom (HAB)-on-a-chip: Development of microfluidic platform to evaluate algae chemotaxis" (PI: Adam Melvin, Student: Kelly O'Quinn); $4,500; Supervised Undergraduate Research Experience (SURE), Louisiana Experimental Program to Stimulate Competitive Research (LA EPSCoR), 05/2014-04/2015
(7) "Design and characterization of small peptide-based reporters to evaluate deubiquitinating enzyme activity" (PI: Adam Melvin); $10,000; 2013-2014 Faculty Research Grant Program, Louisiana State University (LSU) Council on Research, 07/2014 – 06/2015
(8) "Design and characterization of small peptide-based reporters to evaluate deubiquitinating enzyme activity" (PI: Adam Melvin); $10,000; Pilot Funding for New Research (Pfund) grant, Louisiana Experimental Program to Stimulate Competitive Research (LA EPSCoR), National Science Foundation (NSF) and Louisiana Board of Regents, 01/2014 – 12/2014

PUBLICATIONS – RESEARCH ARTICLES

(1) N. Safabakhsh, J. Anderson, M. Vaithiyanathan, J. Pettigrew, G. Pappas, T. Gauthier, and A.T. Melvin. "Rapid uptake and ubiquitination of fluorescent peptides into cancer cells using a β-hairpin sequence motif." (***in preparation***)
(2) N. Safabakhsh, S. Charles, M. Vaithiyanathan, R. Elkhanoufi, W. Wortmann, and A.T. Melvin. "Population-based detection of cell penetrating peptide uptake in a microfluidic droplet trapping array." (***in preparation***)
(3) K. Yates, B.S. Roberts, T. Dugas, S. Bargu, and A.T. Melvin. "Quantification of alkaline phosphatase activity in single algal cells using a microfluidic device." (***in preparation***)
(4) K.M. Houston, A.T. Melvin, G.S. Woss, E.L. Fayer, M.L. Waters, and N.L. Allbritton. "Identification of ornithine-rich β-hairpin peptides as substrates for *in vitro* ubiquitination." ChemBioChem (***under review***)
(5) A.T. Melvin, L.J. Thibodeaux, A.R. Parsons, E. Overton, K. T. Valsaraj, and K. Nandakumar. "Chemodynamic fate of the Macondo 252 oil spill in the gulf: Oil-material fractionation deep within the water column changes the paradigm for oil spill science and engineering." *Marine Pollution Bulletin*, doi: 10.1016/j.marpolbul.2016.02.043, (2016)
(6) A.T. Melvin, L.D. Dumberger, G.S. Woss, M.L. Waters, and N.L. Allbritton, "Identification of a p53-based portable degron based on the MDM2-p53 binding region." *Analyst*, **141**(2), 570-578, (2016)
(7) A.T. Melvin, G.S. Woss, J.H. Park, L.D. Dumberger, M.L. Waters, and N.L. Allbritton, "A comparative analysis of the ubiquitination kinetics of multiple degrons to identify an ideal targeting sequences for a proteasome reporter", *PLOS ONE*, **8**(10), e78082, (2013)
(8) A.T. Melvin, G.S. Woss, J.H. Park, M.L. Waters, and N.L. Allbritton, "Measuring activity in the ubiquitin-proteasome system: From large scale discoveries to single cell analysis", *Cell Biochemistry and Biophysics*, **67**(1), 75-89, (2013)
(9) M.L. Kovarik, D.M. Ornoff, A.T. Melvin, N.C. Dobes, Y. Wang, A.J. Dickinson, P.C. Gach, P.K. Shah, and N.L. Allbritton, "Micrototal analysis systems: Fundamental advances and applications in the laboratory, clinic, and field", *Analytical Chemistry*, **85**, 451-472, (2013)

(10) L. Ott, E.J. Sung, A.T. Melvin, M.K. Sheats, J.M. Haugh, K.B. Adler, and S.L. Jones, "Fibroblast migration is regulated by Myristoylated Alanine-Rich C-Kinase Substrate (MARCKS) protein", *PLOS ONE*, **8**(6), e66512, (2013)

(11) E.S. Welf, S. Ahmed, H.E. Johnson, A.T. Melvin, and J.M. Haugh, "Migrating fibroblasts reorient directionality by a metastable, PI3K-dependent mechanism", *Journal of Cell Biology*, **197**, 105-114, (2012)

(12) A.T. Melvin, E.S. Welf, Y. Wang, D.J. Irvine, and J.M. Haugh, "In chemotaxing fibroblasts, both high-fidelity and weakly biased cell movements track the localization of PI3K signaling", *Biophysical Journal*, **100**, 1893-1901, (2011), featured article

(13) M.C. Weiger, C.C. Wang, M. Krajcovic, A.T. Melvin, J.R. Rhoden, and J.M. Haugh, "Spontaneous phosphoinositide 3-kinase signaling dynamics drive spreading and random migration of fibroblasts", *Journal of Cell Science*, **122**, 313-323, (2009)

(14) S. Cho, W. Lei, A.T. Melvin, and G.W. Rubloff, "Dynamic simulation and optimization of a Cu CVD unit process for environmentally benign manufacturing", *IEEE Transactions on Semiconductor Manufacturing*, **17**(3), 455-469, (2004)

PUBLICATIONS – TEACHING ARTICLES

(1) A. T. Melvin, "A hands-on approach to teaching K-12 students about microfluidic device (Work in Progress)", *2016 ASEE Annual Conference Proceedings* (***accepted***)

(2) K. Whittaker, A. Kirtikar, and A.T. Melvin, "ChemE Camp: A two day workshop to increase student preparedness for their sophomore year in chemical engineering (Work in Progress)", *2016 ASEE Annual Conference Proceedings* (***accepted***)

(3) L.G. Bullard and A.T. Melvin, "Using a role-play video to minimize cheating on assignments", *Advances in Engineering Education*, **2**(3), Winter (2011)

(4) A.T. Melvin, "Tales of a 24th grade nothing: A survivor's guide to graduate school", *2010 ASEE Annual Conference Proceedings*, AC 2010-572, June (2010)

(5) A.T. Melvin and L.G. Bullard, "Seeing is believing: Using a role-play video to establish expectations for academic integrity", *2009 ASEE Annual Conference Proceedings*, AC 2009-266, June (2009)

(6) A.T. Melvin and L.G. Bullard, "Tips from the Trenches: Preparation and implementation of an experience-based TA training session", *2008 ASEE Annual Conference Proceedings*, AC 2008-610, June (2008)

PRESENTATIONS (*presenter is underlined)

(1) K. Yates, B.S. Roberts, T.M. Dugas, D. Englehardt, and A. T. Melvin, "Detection of alkaline phosphatase activity by C. Reinhardtii in a microfluidic device," (poster) *LSU Discovery Day*, (2016), Tuscaloosa, AL, U.S.A.

(2) J. Anderson, N. Safabakhsh, M. Vaithiyanathan, J. Pettigrew, G. Pappas, T. Gauthier, and A.T. Melvin, "Rapid uptake and ubiquitination of fluorescent peptides into mammalian cells using a β-Hairpin sequence motif." (poster) *LSU Discovery Day*, (2016). Baton Rouge, LA, U.S.A.

(3) S. Charles, N.Safabakhsh, M. Vaithiyanathan, R. Elkhanoufi, W. Wortmann, and A.T. Melvin, " Single cell encapsulation using a droplet microfluidic array," (poster) *AIChE Southern Regional Student Conference*, (2016), Tuscaloosa, AL, U.S.A.

(4) T. Dugas, B.S. Roberts, D. Manning, D. Englehardt, and A.T. Melvin, "Quantification of long-term algal growth dynamics using a microfluidic device," (poster) *AIChE Southern Regional Student Conference*, (2016), Tuscaloosa, AL, U.S.A.

(5) K. Yates, B.S. Roberts, T.M. Dugas, D. Englehardt, and A. T. Melvin, "Detection of alkaline phosphatase activity by C. Reinhardtii in a microfluidic device," (poster) *AIChE Southern Regional Student Conference*, (2016), Tuscaloosa, AL, U.S.A.

(6) J. Anderson, N. Safabakhsh, M. Vaithiyanathan, J. Pettigrew, G. Pappas, T. Gauthier, and A.T. Melvin, "Rapid uptake and ubiquitination of fluorescent peptides into mammalian cells using a β-Hairpin sequence motif." (poster) *AIChE Southern Regional Student Conference*, (2016), Tuscaloosa, AL, U.S.A.

(7) A.T. Melvin "Rapid uptake of fluorescent peptides into intact mammalian cells using a β-hairpin sequence motif," *251st ACS National Meeting*, (2016), San Diego, CA, U.S.A.

(8) A.T. Melvin "Exploring alternative materials to fabricate microfluidic gradient generators to study algal growth and migration," *251st ACS National Meeting*, (2016), San Diego, CA, U.S.A

(9) G.S. Woss, A.T. Melvin, K. Houston, M.L. Waters, and N.A. Allbritton "Development of a degradation resistant peptide reporter for monitoring E3 ligase and proteasome activity," *PITTCON Conference and Expo*, (2016), Atlanta, GA, U.S.A

(10) K. O'Quinn, B.S. Roberts, D. Manning, M. Tullier, J. Pojman, and A.T. Melvin "Exploring alternative materials to fabricate microfluidic gradient generators to study algal growth and migration," *AIChE Annual Meeting*, (2015), Salt Lake City, UT, U.S.A

(11) N. Safabakhsh, G. Pappas, and A.T. Melvin "Rapid uptake of fluorescent peptides into intact mammalian cells using a β-hairpin sequence motif", *AIChE Annual Meeting*, (2015), Salt Lake City, UT, U.S.A

(12) S. Charles, N. Safabakhsh, and A.T. Melvin "Single cell encapsulation using a microfluidic droplet generator", (poster) *National Society of Black Engineering (NSBE) Region 5 Conference*, (2015), Kansas City, MO, U.S.A

(13) L. Phelps, C. Danielson, G. Pappas, A.T. Melvin, and K. Park "Rapid and affordable generation of a microdroplet array with an air-spray gun" (poster) *BMES Annual Meeting*, (2015), Tampa, FL, U.S.A

(14) A.T. Melvin, "Quantification of deubiquitinating enzyme activity in cancer cells using a protease-resistant, peptide-based reporter", (poster) *250th ACS National Meeting* (2015), Boston, MA, U.S.A

(15) G. Pappas, N. Safabakhsh, and A.T. Melvin "Rapid uptake of fluorescent peptides into intact mammalian cells using a β-hairpin sequence motif", (poster) *LSU Summer Undergraduate Research Forum (SURF*), Baton Rouge, LA, U.S.A

(16) S. Charles, N. Safabakhsh, and A.T. Melvin "Single cell encapsulation using a microfluidic droplet generator", (poster) *LSU Summer Undergraduate Research Forum (SURF*), Baton Rouge, LA, U.S.A

(17) L. Phelps, C. Danielson, G. Pappas, A.T. Melvin, and K. Park, "Characterization of a microdroplet array for highly sensitive biomedical detection", (poster) *LSU Summer Undergraduate Research Forum (SURF*), Baton Rouge, LA, U.S.A

(18) K. O'Quinn, M. Tullier, J. Pojman, and A.T. Melvin "Development of a flow-free microfluidic gradient generator", (poster) *LSU Discovery Day* (2015), Baton Rouge, LA, U.S.A.

(19) L. Phelps, C. Danielson, G. Pappas, A.T. Melvin, and K. Park, "Characterization of a microdroplet array for highly sensitive biomedical detection", (poster) *LSU Discovery Day*, (2015), Baton Rouge, LA, U.S.A.

(20) A.T. Melvin, "Quantification of deubiquitinating enzyme activity in cancer cells using a protease-resistant, peptide-based reporter", *AIChE Annual Meeting*, (2014), Atlanta, GA, U.S.A

(21) A.T. Melvin, "Harmful algal bloom (HAB)-on-a-chip: Development of a microfluidic device to characterize algal chemotaxis", (poster) *AIChE Annual Meeting*, (2014), Atlanta, GA, U.S.A.

(22) K. O'Quinn, M. Tullier, J. Pojman, and A.T. Melvin, "Development of a flow-free microfluidic gradient generator", (poster) *AIChE Annual Meeting*, (2014), Atlanta, GA, U.S.A.

(23) S. Charles, C. Landry, and A.T. Melvin, "Single-cell encapsulation using a droplet microfluidic array", (poster) *AIChE Annual Meeting*, (2014), Atlanta, GA, U.S.A.
(24) K. O'Quinn and A.T. Melvin, "Development of a flow-free microfluidic gradient generator", (poster) *LSU Summer Undergraduate Research Forum (SURF*), Baton Rouge, LA, U.S.A.
(25) S. Charles, P. O'Brien, and A.T. Melvin, "Single-cell encapsulation using a microfluidic device", (poster) *LSU Summer Undergraduate Research Forum (SURF*), Baton Rouge, LA, U.S.A.
(26) G.S. Woss, A.T. Melvin, K. Houston, L.D. Dumberger, M.L. Waters, and N.L. Allbritton, "Development of peptide reporters for monitoring E3 ligase and proteasome activity in single cells", *PITTCON Conference & Expo*, (2014), Chicago, IL, U.S.A.
(27) K. Houston, A.T. Melvin, N.L. Allbritton, and M.L. Waters, "Identification of a protease-resistant degron", (poster) *23rd American Peptide Symposium*, (2013), Big Island, HI, U.S.A.
(28) A.T. Melvin, M.L. Waters, and N.L. Allbritton, "Development and characterization of degron-based substrates capable of E3 ligase-mediated ubiquitination", *AIChE Annual Meeting*, (2012), Pittsburgh, PA, U.S.A.
(29) A.T. Melvin, M.L. Waters, and N.L. Allbritton, "Development and characterization of degron-based substrates capable of E3 ligase-mediated ubiquitination", *BMES Annual Meeting*, (2012), Atlanta, GA, U.S.A.
(30) A.T. Melvin, M.L. Waters, and N.L. Allbritton, "Development and characterization of degron-based substrates capable of E3 ligase-mediated ubiquitination", (poster) *Ubiquitin Drug Discovery and Diagnostic*s, (2012), Philadelphia, PA, U.S.A.
(31) A.T. Melvin, M.L. Waters, and N.L. Allbritton, "Development and characterization of degron-based substrates capable of E3 ligase-mediated ubiquitination", *AIChE Annual Meeting*, (2011), Minneapolis, MN, U.S.A.
(32) E.S. Welf, S. Ahmed, H.E. Johnson, A.T. Melvin, and J.M. Haugh, "Migrating fibroblasts reorient directionality by a metastable, PI3K-dependent mechanism", (poster) *ASCB Annual Meeting*, (2011), Denver, CO, U.S.A.
(33) A.T. Melvin, S. Ahmed, and J.M. Haugh, "Asymmetry of PI3K signaling dynamics coincides with directional fidelity of fibroblast chemotaxis", (poster) *ASCB Annual Meeting*, (2009), San Diego, CA, U.S.A.
(34) A.T. Melvin, M.C. Weiger, and J.M. Haugh "Signaling Vector Analysis (SVA) of intracellular pathways governing cell migration", (poster) *ASCB Annual Meeting*, (2008), San Francisco, CA, U.S.A.

PROFESSIONAL ACTIVITES

Conference participation: Chair/Co-Chair of technical sessions at 2015 and 2016 AIChE annual meeting (division 15C); Judge for undergraduate research poster session at national and regional AIChE meetings (2015-2016)

Ad hoc proposal reviewer for: National Science Foundation (CBET-BBE), National Institute of Health (ISD), LSU AgCenter Experiment Station Research Proposal, and Louisiana Biomedical Research Network.

Journal reviewer for: Colloid and Interface Science Communications, Biomicrofluidics, Micromachines, Environmental Engineering Science, and Aerosol and Air Quality Research

Outreach: Presenter for LSU College of Engineering summer camps REHAMS, XCITE, and Project NJneer; Member of the LSU College of Engineering Diversity Board; Panelist for LSU University Hearing Panel (UHP); LSU Communication across the Curriculum (CXC) advisor; Advisor for LSU AIChE student chapter;

Member of LSU CHE graduate admissions committee; Mentor for Louisiana State Science Fair competition (students from St. Joseph's Academy)

COLLABORATORS & OTHER AFFILIATIONS

Collaborators:
Michael Benton (LSU), James Dorman (LSU), W. Todd Monroe (LSU), Naohiro Kato (LSU), John Pojman (LSU), Kidong Park (LSU), Sibel Bargu Ates (LSU), Louis Thibodeaux (LSU), Ian Schneider (Iowa State University), Younghun Kim (University of Alabama)

Advisors:
Nancy L. Allbritton, Postdoc advisor (University of North Carolina)
Jason M. Haugh, PhD/MS advisor (North Carolina State University)
Christine S. Grant, Graduate advisor (North Carolina State University)

Graduate Advisees:
Nora Safabakhsh (PhD candidate), Benjamin 'Seth' Roberts (MS candidate), Manibarathi Vaithiyanathan (PhD candidate)

Undergraduate Advisees:
Current: Seleipiri Charles, Kelly Yates, Gavin Pappas, Devin Manning, David Englehardt, Travis Dugas, Jeffrey Anderson, Rachel Nguyen, Riad Elkhanoufi, Wayne 'Trey' Wortmann III, Joshua Baldassaro, Jacob Pettigrew, Amy Morgan, Annie O'Keefe.

Alumni: Kelly O'Quinn (BS 2015)

TEACHING ACTIVITIES

2016	ChE 4260: Biochemical Engineering, ChE 4162: Unit Operations Laboratory
2015	ChE 2171: Chemical Engineering Fundamentals, ChE 4162: Unit Operations Laboratory
2014	ChE 4162: Unit Operations Laboratory, ChE 4260: Biochemical Engineering, ChE 7700: Special Topics in Chemical Engineering
2013	ChE 4260: Biochemical Engineering
2006-2010	NCSU College of Engineering TA Training Sessions: Survival Skills and Tips from the Trenches
2007	CHE 205: Chemical Process Principles (NCSU)