**Nancy L. Allbritton, MD, PhD**
**Kenan Professor**
**Joint Department of Biomedical Engineering**
**Based in the:**
**School of Medicine, University of North Carolina, Chapel Hill,**
**College of Arts and Sciences, University of North Carolina, Chapel Hill,**
**College of Engineering, North Carolina State University, Raleigh**

## ADDRESS

Chapman Hall, Rm 241, Campus Box 3216, University of North Carolina, Chapel Hill, NC 27599-3290
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## ADDITIONAL AFFILIATIONS

Department of Chemistry, Department of Applied Physical Sciences, Department of Pharmacology, Division of Molecular Pharmaceutics, Lineberger Comprehensive Cancer Center, University of North Carolina, Chapel Hill, NC

Department of Materials Science & Engineering, North Carolina State University, Raleigh, NC

## EDUCATION

| | | |
|---|---|---|
| 1987 | Ph.D. | Medical Physics/Medical Engineering, Health Sciences and Technology, Massachusetts Institute of Technology, Cambridge, MA; Supervisor: Dr. Herman Eisen |
| 1985 | M.D. | Medicine, Johns Hopkins University School of Medicine, Baltimore, MD |
| 1979 | B.S. | Physics, Louisiana State University, Baton Rouge, LA |

## POSITIONS/EMPLOYMENT

| | |
|---|---|
| 2015 - current | Kenan Endowed Chair, UNC |
| 2013 - current | Professor, Division of Molecular Pharmaceutics, UNC |
| 2011 - 2013 | Chair, Curriculum in Applied Sciences and Engineering, UNC |
| 2010 - current | Professor, Dept. of Materials Science & Engineering, NC State |
| 2009 - current | Chair, Joint Dept. of Biomedical Engineering, UNC and NC State |
| 2009 - current | Distinguished Professor, Dept. of Biomedical Engineering, UNC and NC State |
| 2008 - current | Distinguished Professor, Dept. of Pharmacology, UNC |
| 2007 - current | Distinguished Professor, Dept. of Chemistry, UNC |
| 2004 - 2007 | Professor, Dept. of Physiology and Biophysics, Biomedical Engineering, Chemistry, and Chemical Engineering and Materials Science, UCI (Univ. of Calif., Irvine) |
| 2000 - 2004 | Associate Professor, Dept. of Physiology and Biophysics, and Biomedical Engineering, UCI |
| 1994 - 2000 | Assistant Professor, Dept. of Physiology and Biophysics, UCI |
| 1989 - 1994 | Postdoctoral Fellow with Dr. Lubert Stryer, Dept. of Cell Biology, Stanford University |
| 1988 - 1989 | Postdoctoral Fellow with Dr. Herman Eisen, Center for Cancer Research, MIT |

## PROFESSIONAL AWARDS/RECOGNITION

| | |
|---|---|
| **2017** | **Recipient of Edward Kidder Graham Award for Leadership and Service to UNC and the State of North Carolina** |
| 2017 - 2020 | Elected as a member of the Electorate Nominating Committee (ENC) of the Section on Medical Sciences in AAAS |

2017 - 2020 Advisory Board, Coulter Dept. of Biomedical Engineering at Georgia Tech and Emory University

**2017 UNC "Inventor of the Year" Award**

2017 Nominated for NAE Gordon Prize by Sharra Kerns, Founding Dean of Engineering, Olin College and previous Gordon Prize winner

2016 - 2021 Editorial Board, Annual Reviews in Analytical Chemistry

2016 - 2019 Advisory Board, Dept. of Bioengineering, Imperial College, London 2016 Charles M. Knight Lecturer at The University of Akron

**2016 ACS Division of Analytical Chemistry, Award in in Chemical Instrumentation 2015 Elected as a Fellow, AAAS**

2015 IEEE Life Sciences Leadership Award

**2015 Top Scoring Transformative Grant; Featured in NIH Director Collin's Blog** https://directorsblog.nih.gov/2016/09/22/creative-minds-making-a-miniature-colon-in- the-lab/

**2015 Elected as a Fellow, National Academy of Inventors**

**2014 Allbritton start-up company Protein Simple acquired by Bio-Techne for $308 M**

2013 - 2016 Member, Scientific Advisory Committee, Beckman Foundation

2012 - 2014 Analytical Chemistry Editorial Advisory Board

2010 - 2013 National Councilor Member, Biophysical Society

**2010 Elected as a Fellow, American Institute for Medical & Biological Engineering**

2004 UCI College of Medicine Excellence in Teaching Award 2003 UCI Midcareer Research Award

**1995 Searle Scholar Award**

**1995 Beckman Young Investigator Award**

## ENTREPRENEURIAL ACTIVITIES

2015 Scientific Founder Altis Biosystems, Chapel Hill, NC
Commercialization of novel assays using an *ex vivo* intestinal epithelium platform

2010 Scientific Founder of Cell Microsystems, Research Triangle Park, NC
Commercialization of an array-based cell sorting platform.
2017 projected revenue: $2 M

2003 Scientific Founder of Protein Simple (Cell Biosciences), Palo Alto, CA Commercialized enzyme assay and protein measurement tools for small-scale samples. Protein Simple acquired by Bio-Techne for $308 million in 2014.

## PUBLICATIONS (>270 IN TOTAL; >7,800 CITATIONS)

## SAMPLING OF FULL LENGTH JOURNAL PUBLICATIONS (160 TOTAL)


Wang, Y., Gunesakara, D.B., Reed, M.I., DiSalvo, M., Nguyen, D.L., Bultman, S.J., Sims, C.E., Magness, S.T., Allbritton, N.L. Formation of Human Colonic Crypt Array by Application of Chemical Gradients across a Shaped Epithelial Monolayer. *Cellular and Molecular Gastroenterology and Hepatology.* In Press.

Wang, Y., Gunesakara, D.B., Reed, M.I., DiSalvo, M., Nguyen, D.L., Dutton, J., Bultman, S.J., Sims, C.E., Magness, S.T., Allbritton, N.L. In vitro Generation of Mouse Colon Crypts. *ACS Biomaterials Sci. Eng.* In Press.

Wang, Y., DiSalvo, M., Gunesakara, D.B., Dutton, J., Proctor, A., Lebhar, M.S., Williamson, I.A., Speer, J., Howard, R.L., Smiddy, N.M., Bultman, S.J., Sims, C.E., Magness, S.T., Allbritton, N.A. 2017. A self-renewing monolayer of primary colonic epithelial cells. *Cellular and Molecular Gastroenterology and Hepatology*. 4, 165–182.

Proctor, A., Sims, C.E., Allbritton, N.L. 2017. Chemical fixation to arrest phospholipid signaling for

chemical cytometry. J. Chromat. A. doi:10.1016/j.chroma.2017.05.022 [Epub ahead of print].
Attayek, P.J., Waugh, J.P., Hunsucker, S.A., Grayeski, P.J., Sims, C.E., Armistead, P.M., Allbritton, N.L. 2017 Automated microraft platform to identify and collect non-adherent cells successfully gene-edited with CRISPR-Cas9. *Biosensors Bioelectronics.* 91, 175-182.
Wang, Y., Gunesakara, D.B., Reed, M.I., DiSalvo, Bultman, S.J., Sims, C.E., Magness, S.T., Allbritton, N.L. 2017. A microengineered collagen scaffold for generating polarized crypt-villus architecture of human small intestinal epithelium. *Biomaterials.* 128, 44-55.
Ornoff, D.M., Wang, Y., Proctor, A., Shah, A.S., Allbritton, N.L. 2016. Co-fabrication of chitosan and epoxy photoresist to form microwell arrays with permeable hydrogel bottoms. *Biomaterials.* 74, 77-88.
Turner, A.H., Lebhar, M.S., Proctor, A, Wang, Q., Lawrence, D.S., Allbritton, N. L. 2016. Rational design of a a dephosphorylation-resistant reporter enables single-cell measurement of tyrosine kinase activity. *ACS Chem. Bio.* 11, 355−362.
Attayek, P.J. Ahmad, A.A., Wang, Y., Williamson, I., Sims, C.E., Magness, S.T., Allbritton, N.L. 2016. In vitro Polarization of Colonoids to Create an Intestinal Stem Cell Compartment. *Plos One.* 11, e0153795.
Welch, J.D., Williams, L.A, DiSalvo, M., Brandt, A.T., Marayati. R., Sims, C.E., Allbritton, N.L., Prins, J.F., Yeh, J.J., Jones, C.D. 2016. Selective Single Cell Isolation for Genomics Using Microraft Arrays. *Nucleic Acids Research*. 44, 8292-8301.
Mainz, E.R., Serafin, S.D., Nguyen, T.T., Tarrant, T.K., Sims, C.E., Allbritton, N.L. 2016. Single Cell Chemical Cytometry of Akt Activity in Fibroblast-like Synoviocytes Reveals Heterogeneity in Responses of Rheumatoid Arthritis Subjects to Tumor Necrosis Factor α. *Anal. Chem.* 88, 7786-7792.
Mainz, E.R., Wang, Q., Lawrence, D.S., Allbritton, N.L. 2016. An Integrated Chemical Cytometry Method: Shining a Light on Akt Activity in Single Cells. *Angewandte Chemie.* 55, 13095-13098.
Attayek, P.J., Hunsucker, S.A., Sims, C.E., Allbritton, N.L., Armistead, P.M. 2016. Identification and isolation of antigen-specific cytotoxic T lymphocytes with an automated microraft sorting system. *Integrative Biology*. 8, 1208-1220.
Gracz, A.D., Williamson, I.A., Johnston, M.J., Wang, F., Wang, Y, Attayek, P.J., Balowski, J., Liu, X.F., Laurenza, R.J., Sims, C.E., Galanko, J.A., Li, L., Allbritton, N.L., Magness, S.T. 2015. A high throughput platform for stem cell-niche co-cultures and downstream gene expression analysis. *Nature Cell Biology.* 17:340-349.
Dickinson, A.J., Meyer, M., Pawlak, E.A., Gomez, S., Jaspers, I., Allbritton, N.L. 2015. Analysis of Sphingosine Kinase Activity in Single Natural Killer Cells from Peripheral Blood. *Integr. Biol.* 7: 392-401.
Wilson, J.E., Petrucelli, A.S., Chen, L., Koblansky, A.A., Truax, A.D., Oyama, Y., Rogers, A.B., Brickey, W.J., Wang, Y., Schneider, M., Mühlbauer, M., Chou, W.C., Barker, B., Jobin, C., Allbritton, N.L., Ramsden, D.A., Davis, B.K., and Ting, J.P.Y. 2015. Inflammasome-independent role of AIM2 in suppressing colon tumorigenesis by interfering with DNA-PK-dependent Akt activation. *Nature Medicine.* 21:906-913.
Gach, P.C., Attayek, P.J., Whittlesey, R.L., Yeh, J.J., Allbritton, N.L. 2014. Micropallet Arrays for the Capture, Isolation and Culture of Circulating Tumor Cells from Whole Blood of Mice Engrafted with Primary Human Pancreatic Adenocarcinoma. *Biosensors & Bioelectronics.* 54: 476-483.
Shah, P.K., Walker, M.P., Sims, C.E., Major, M.B., Allbritton, N.L. 2014 Characterization of β-catenin activated reporter dynamics and evolution by massively parallel clonogenic screening. *Integr. Biol.* 6: 673-684.
Ornoff, D.M., Wang, Y., Allbritton, N.L. 2013. Characterization of freestanding photoresist films for biological and MEMS applications. *J. Micromech. Microeng.* 23: 025009.
Kovarik, M.L., Shah, P.K., Armistead, P.M., Allbritton, N.L. 2013. Microfluidic Chemical Cytometry of

Peptide Degradation in Single Drug-Treated Acute Myeloid Leukemia Cells. *Anal Chem.* 85: 4991–4997.
Balowski, J.J., Wang, Y., Allbritton, N.L. 2013. Fabrication of 3-D Microstructures from the Interactions of Immiscible Liquids with a Structured Surface. *Advanced Materials*. 10.1002/adma.201301658.
Nguyen, L.T., Allbritton, N.L., Lawrence, D.S. 2013. Lipid Pools as Photolabile "Protecting Groups": Design of Light-Activatable Bioagents. *Angewandte Chemie.* 125: 10120-10123.
Shah, P.K., Hughes, M.R., Wang, Y., Sims, C.E., Allbritton, N.L. 2013. Scalable synthesis of a biocompatible, transparent and superparamagnetic photoresist for microdevice fabrication. *J. Micromech. Microeng.* 23: 107002.
Wang, Y., Sims, C.E., Allbritton, N.L. 2012. Dissolution-Guided Wetting for Microarray and Microfluidic Devices. *Lab Chip.* 12: 3036-3039.
Proctor, A., Wang, Q., Lawrence, D.S., Allbritton, N.L. 2012 Development of a Peptidase-Resistant Substrate for Single-Cell Measurement of Protein Kinase B Activation. *Anal. Chem.* 84: 7195–7202.
Kovarik, M.L., Allbritton N.L., 2011. Measuring enzyme activity in single cells. *Trends Biotech.* 29:222-230.
Phillips, K.S., Lai, H.H., Johnson, E., Sims, C.E., Allbritton, N.L. 2011. Continuous chemical analysis of single cells on a microfluidic chip. *Lab Chip*. 11:1333-1341.
Wang, Y., Balowski, J., Phillips, C., Phillips, R., Sims, C.E., Allbritton, N.L. 2011. Benchtop Micromolding of Polystyrene by Soft Lithography. *Lab Chip.* 11:3089-3097.
Grohman, J.K., Kottegoda, S., Gorelick, R.J., Allbritton, N.L., Weeks, K.M. 2011. Ultra-sensitive SHAPE reveals regulatory structures in the authentic XMRV RNA genome. *JACS.* 133:20326–20334.
Gach, P.C., Sims, C.E., Allbritton, N.L. 2010. Transparent Magnetic Photoresists for Bioanalytical Applications. *Biomaterials.* 31:8810-8817.
Wang, Y., Phillips, P., Pai, J.H., Xu, W., Sims, C.E., Allbritton, N.L. 2010. Micromolded Arrays for Separation of Adherent Cells. *Lab Chip.* 10:2917-2124.
Hu, S., Ren, X., Bachman, M., Sims, C.E., Li, G.P., Allbritton, N.L. 2004. Tailoring the Surface Properties of Poly(dimethylsiloxane) Microfluidic Devices. *Langmuir*. 20: 5569-5574.
McClain, M.A., Culbertson, C.T., Jacobson, S.C., Allbritton, N.L., Sims, C.E., Ramsey, J.M. 2003. Microfluidic Devices for the High Throughput Chemical Analysis of Cells. *Anal. Chem.* 75: 5646-5655.
Hu, S., Ren, X., Bachman, M., Sims, C.E., Li, G.P., Allbritton, N.L. 2002. Surface Modification of Poly(dimethylsiloxane) Microfluidic Devices by Ultraviolet Polymer Grafting. *Anal. Chem.* 74: 4117-4123.
Meredith, G., Sims, C.E., Soughayer, J.S., Allbritton, N.L. 2000. Measurement of Kinase Activation in Single Mammalian Cells. *Nature Biotech.* 18: 309-312.
Lee, C.L., Linton, J., Soughayer, J.S., Sims, C.E., Allbritton, N.L. 1999. Localized Measurement of Kinase Activation in Oocytes of *Xenopus laevis*. *Nature Biotech.* 17: 759-762.
Shear, J.B., Fishman, H.A., Allbritton, N.L., Garigan, D., Zare, R.N., Scheller, R.H. 1995. Single Cells as Biosensors for Chemical Separations. *Science.* 267: 74-77.
Allbritton, N.L., Oancea, E., Kuhn, M., Meyer, T. 1994. Source of Nuclear Calcium Signals. *Proc. Natl. Acad. Sci. U.S.A.* 91: 12458-12462.
Allbritton, N.L., Meyer, T., and Stryer, L. 1992. Range of Messenger Action of Calcium Ion and Inositol 1,4,5-Trisphosphate. *Science.* 258: 1812-1818.

**PATENTS (ISSUED + PENDING: >20)**

**INVITED PRESENTATIONS AT PROFESSIONAL MEETINGS/EDUCATIONAL INSTITUTIONS/COMPANIES- TOTAL OF >260**

**PARTIAL LISTING OF RESEARCH FUNDING (EXCLUDING NIH TRAINING GRANTS & OTHER STUDENT AWARDS/FELLOWSHIPS)**

Dr. Allbritton's research program has been awarded >$60 M in grant funding since 1994.

| **Current** | **Role** | **Dates** |
|---|---|---|
| NIH R01CA203032 | Lawrence (P.I.)<br>Allbritton (co-P.I.) | 2/16 - 1/21 |
| *Single Cell Sampling of Signaling Activity in Triple Negative Breast Cancer* | | |
| NIH R42GM106421 | Allbritton (P.I.) | 2/16 - 1/18 |
| *The CellRaft AIR System: Workflow Automation for Stem Cell Isolation and Recovery* | | |
| NIH R01 DK109559 | Allbritton (lead P.I.), Gomez, Bultman, Magness (co-P.I.s) | |
| *Development of Human Intestinal Simulacra* | | 9/15 - 7/20 |
| NIH R01 EY024556 | Allbritton (P.I.) | 9/14 - 5/19 |
| *Generation of a Gene-Targeted Human iPS Cell Library for Macular Degeneration* | | |
| NIH R01 CA177993 | Allbritton (P.I.) | 8/14 - 5/19 |
| *Single-Cell Measurement of Lipid Signaling in Colorectal Cancer* | | |
| NIH R41AI126905 | Allbritton (P.I.) | 7/16 - 7/17 |
| *CellRaft Array for Screening and Isolation of Highly Effective Cytotoxic T Cells* | | |

| **Past** | **Allbritton Role** | **Dates** |
|---|---|---|
| NIH subaward from Duke | Allbritton (P.I.) | 1/15 - 12/16 |
| *Single cell analysis of intratumoral heterogeneity in parathyroid neoplasia* | | |
| NIEHS | Jaspers (P.I.)<br>Allbritton (co-P.I.) | 8/13 - 6/16 |
| *Partnership to enhance studies on pollutant-innate immune response interactions* | | |
| NCBC 182190/Duke Subcontract | Allbritton (P.I.) | 2/12 -2/14 |
| North Carolina Biotechnology Center | | |
| *Modeling, microfluidics and quantitative single cell signaling dynamics* | | |
| University Cancer Research Fund | Magness (P.I.) | 6/11 - 5/13 |
| Innovation Award | Allbritton (co-P.I.) | |
| *Colon on a Chip* | | |
| NIH R01 EB012549 | Allbritton (P.I.) | 2/11 - 1/15 |
| *Arrays for Cloning Growth Suppressed Cells* | | |
| NIH R01 HG004843-S1 | Allbritton (P.I.) | 2/11 - 1/14 |
| *Supplement to Rapid Genetic Engineering of Stem Cells* | | |
| NCBiotech IDG Grant | Allbritton (P.I.) | 1/11 - 12/11 |
| *Advanced Micromachining Capabilities for Creating State-of-the-Art Biomedical Microdevices* | | |

NIH R01 EB011763 Allbritton (P.I.) 4/10 - 1/15
*Protectides: A tool for drug target assays in myeloma*

NIH R01 CA140173 Lawrence (P.I.) 5/09 - 4/15
Allbritton (co-P.I.)
*Signaling Network Dynamics in Metastatic Prostate Cancer*

NIH R01 CA139599 Allbritton (P.I.) 3/09 - 1/15
*Multiplexed Measurement of Kinase Activity in Single Cancer Cells*

NIH R01 HG004843 Allbritton (P.I.) 2/09 - 1/14
*Rapid Genetic Engineering of Stem Cells*

NIH R01 EB007612 Allbritton (P.I.) 4/07 - 3/12
*Micropallet Arrays for Separation of Single Cells and Colonies*

**RESEARCH PROPOSAL REVIEW**

2017: Bioengineering Member Conflict Review Panel, ZRG1 BST-X (02)M
2016-2017: Chair, NIH Transformative Grant Editorial Review Board
2015-2017: Member, NIH Transformative Grant Editorial Review Board
2014: Chair, study section for NIH Physical Sciences and Oncology Centers
2013-2014: Beckman Young Investigator Awards
2013: Ad-Hoc Member of NIH study section, ISD- Instrumentation and Systems Design
2008-2009: Reviewer for University Cancer Research Fund Innovation Awards, UNC
2008: University Cancer Research Fund
2007-2009: Chair, NIH Study Section, EBT- Enabling Bioanalytical and Biophysical Technologies
2005: External Reviewer for Canada Research Chairs
2004-2009: Permanent Member, NIH Study Section, EBT- Enabling Bioanalytical and Biophysical Technologies

**EDITORIAL PANELS AND BOARDS**

2017 Guest Editor, American Gastroenterology Association Journal Cellular and Molecular Gastroenterology and Hepatology
2016 - 2021 Editorial Board, Annual Review of Analytical Chemistry
2012 - 2014 "Analytical Chemistry" Editorial Advisory Board
2004 - 2005 A-Page Advisory Panel for "Analytical Chemistry"

**MAJOR ACCOMPLISHMENTS AS CHAIR OF THE UNC/NC STATE JOINT DEPARTMENT OF BIOMEDICAL ENGINEERING (2009-2017)**

***BME Chair reports to: 3 Deans (CAS, COE, SOM) and 2 Provosts (UNC, NC State)***

1. *Built a fully joint department spanning two universities and three schools/colleges*
2. *Established a BME Charter describing the operation of the joint department*
3. *Fostered a cross-disciplinary and cross-campus research identity to build connections between the two flagship North Carolina campuses*
4. *Achieved an a 4.6-fold increase in departmental extramural research funding despite a 33% reduction in operating budget*

5. *Remade the BME curricula to provide innovative educational experiences at both undergraduate and graduate levels*
6. *Implemented Departmental strategic planning initiatives*
7. *Leadership Review Evaluation of Dr. Allbritton by Committee of External+Internal Reviewers (2016)*