

David C. Muddiman, Ph.D

Jacob and Betty Belin Distinguished Professor

Director: Molecular Education, Technology and Research Innovation Center

and

Department of Chemistry

608 Cox Hall

2620 Yarbrough Dr.

North Carolina State University

Raleigh, NC 27695-8204

919.513.0084 (Office)

Email: dcmuddim@ncsu.edu

Research Group: www.muddimanlab.com

METRIC: <https://research.ncsu.edu/metric/>



Date and Place of Birth:

December 29, 1967

Long Beach, CA, USA

Title

Controlling Chaos: A Novel Molecular Microscopy Platform with Diverse Applications in Human Health and Disease

Abstract

Since its first demonstration in the 1960's, the field of mass spectrometry imaging (MSI) has emerged as a fruitful area of scientific research with significant impacts to human health. To date, SIMS, MALDI, and DESI have been the primary ionization methods utilized in the field and these approaches have resulted in key new findings for a diverse range of scientific questions. However, other emerging ionization methods have great potential to impact the field of MSI. We invented matrix-assisted laser desorption electrospray ionization (MALDESI) in 2005 and over the past 17 years, we have made tremendous progress in the fundamentals, source development, and demonstrated the principal advantages of this ionization technique.

Mass spectrometry imaging offers a versatile and robust platform to discover and characterize new diagnostic, prognostic, and therapeutic biomarkers for disease, elucidate and understand pathways including protein-protein interactions, visualize endogenous and exogenous compound distributions in tissues via mass spectrometry imaging, and characterize post-translational modifications. Moreover, a Multi-OMIC approach will allow the underlying biology to be defined, enabling modeling of pathways and identify potential drug targets. This presentation will cover a diverse range of biological questions including Alzheimer's disease, xenobiotic metabolism, cancer as well as wound healing. These approaches are made possible by innovations in chemistry and novel ionization sources developed in our laboratory. The fundamentals of these strategies will be integrated throughout the presentation.

Biography

David C. Muddiman is the Jacob and Betty Belin Distinguished Professor of Chemistry and Director, Molecular Education, Technology and Research Innovation Center (METRIC) at North Carolina State University in Raleigh, NC. Prior to moving his research group to North Carolina State University in 2005, David was a Professor of Biochemistry and Molecular Biology and Founder and Director of the Proteomics Research Center at the Mayo Clinic College of Medicine in Rochester, MN. Prior to this appointment, David was an Associate Professor of Chemistry at Virginia Commonwealth University. It was there that he began his professional career as an assistant professor with an adjunct appointment in the Department of Biochemistry and Molecular Biophysics and as a member of the Massey Cancer Center in 1997. These academic appointments were preceded by a postdoctoral fellowship at Pacific Northwest National Laboratory in the Environmental Molecular Sciences Laboratory under Richard D. Smith from 1995-1997. David was born in Long Beach, CA in 1967 but spent most of his formative

years in a small town in Pennsylvania. David received his B.S. in chemistry from Gannon University (Erie, PA) in 1990 and his Ph.D. in Analytical Chemistry from the University of Pittsburgh in 1995 under the auspices of David M. Hercules. Dr. Muddiman was Editor of *Analytical and Biological Chemistry* (2015-2020) and he currently the Coordinating Editor of *Journal of Mass Spectrometry* (2022-present) serves on the Editorial Advisory Board of *Molecular and Cellular Proteomics*, *Rapid Communications in Mass Spectrometry*, and the *Journal of Chromatography B*. He also serves as the Chair of the advisory board of the NIH Funded Yale/NIDA Neuroproteomics Center, Yale University. Dr. Muddiman has served as a member of the ASMS Board of Directors (2013-2015) and Treasurer (2013-2015) and President (2015-2017) of the United States Human Proteome Organization. His group has presented over 700 invited lectures and presentations at national and international meetings including 31 plenary/keynote lectures. His group has published over 300 peer-reviewed papers and has received six US patents. He is the recipient of the 2016 Graduate School Outstanding Graduate Faculty Mentor Award in the Mathematical, Physical Sciences, and Engineering, 2015 ACS Award in Chemical Instrumentation, 2010 Biemann Medal (American Society for Mass Spectrometry), 2009 NCSU Alumni Outstanding Research Award, the 2004 ACS Arthur F. Findeis Award, the 1999 American Society for Mass Spectrometry Research Award, and the 1990-1991 Safford Award for Excellence in Teaching (University of Pittsburgh). Dr. Muddiman's research is at the intersection of innovative mass spectrometry platform technologies, systems biology, environmental science, and model organisms to understand human disease and is largely funded by the National Institutes of Health.

His personal interests include playing ice hockey, cycling, hiking, restoring sports cars, and spending time with family.