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EDUCATION

08/98-05/02 B.S. in Chemistry with a concentration in Biochemistry (magna cum laude), University of Louisville, Louisville, KY, USA
08/02-12/06 M.S. in Chemistry, University of Louisville, Louisville, KY, USA
08/02-12/07 Ph.D. in Chemistry, University of Louisville, Louisville, KY, USA

POST-DOCTORAL RESEARCH

01/08-02/09 Post-Doctoral Research Fellow, University of Louisville, Louisville, KY, USA
08/09-07/11 Alexander von Humboldt Research Fellow, MPI for Biophysical Chemistry, Dept. NMR based Structural Biology, Göttingen, Germany
08/11-01/15 Post-Doctoral Research Fellow, MPI for Biophysical Chemistry, Dept. NMR based Structural Biology, Göttingen, Germany

ACADEMIC APPOINTMENTS

02/15-present Assistant Professor of Medicine, Division of Medical Oncology and Hematology, Department of Medicine, University of Louisville, Louisville, KY, USA
2016-present Associate Faculty member, Department of Biochemistry and Molecular Genetics, University of Louisville, Louisville, KY, USA

OTHER EDUCATION AND EMPLOYMENT

1999-2002 Barista and Shift Leader, Heine Bros Coffee, Louisville, KY, USA
06/09-07/09 German Intensive Language Course (A2.2), Goethe Institute, Göttingen, Germany

PROFESSIONAL MEMBERSHIPS AND ACTIVITIES

2003-04 Treasurer, Chemistry Graduate Student Association
2004 Poster Judge, Kentuckiana Undergraduate Research Symposium
2004-09 American Chemical Society
2004-12,15-16 Protein Society
April 2018 Guest Editor of a Special Issue for the journal *Methods: New Methods in Biomolecular Nuclear Magnetic Resonance Spectroscopy*

HONORS AND AWARDS

2002 American Chemical Society Award in Chemistry
2003-04 University of Louisville Chemistry Research Scholars Fellowship
2004,07 IMD3 Travel Award
2009-11 Alexander von Humboldt Fellowship

MEETING ORGANIZER

2015 NMR Meeting, Louisville, KY, December 2nd, 2015

2016 1st Gateway NMR Meeting, Louisville, KY, November 12, 2016

EDUCATIONAL ACTIVITIES

- 2002-04 Teaching Assistant, Department of Chemistry, University of Louisville:
Biochemistry Laboratory, Organic Chemistry Recitation, Honors Organic Chemistry Laboratory, and
Organic Chemistry Laboratory
- 2008-18 Mentoring and Advising
-Graduate Students, Post-Doctoral Research Fellows, and lab rotation students
Teaching and participation in weekly Lecture Series on NMR theory, instrumentation, and application
- 2015-18 Lecturer, Department of Biochemistry and Molecular Genetics, University of Louisville:
-645 Advanced Biochemistry Lecture (Sept 11, 2015 and Sept 9, 2016)
-680 Biomolecular Interactions Lectures (Sept 29/Oct 1, 2015 and Oct 25/Nov 3 2016)
- 2016-17 Mentor for High School Summer Research Internship Program (8 weeks June-July)

INSTRUMENT RESPONSIBILITIES

- 2006-09 Applied Biosystems DE-Voyager MALDI-TOF MS
- 2009-14 700 MHz Oxford Magnet/Bruker Avance III Spectrometer
Bruker Hardware certification (2010)
- 2013-14 NMR Measurement Time Distribution for the Groups of Christian Griesinger and Donghan Lee

ABSTRACTS AND PRESENTATIONS

ORAL PRESENTATIONS

National/International Meetings

1. FASEB Summer Research Conference: Proteases in Hemostasis and Vascular Biology, Indian Wells, CA, June 2-7 2007: Biophysical analysis of GpIb α (269-286) peptide interactions with thrombin's anion binding exosite II.
2. 1st International Conference on Molecular Recognition, Heraklion, Greece, June 6-11, 2010: Investigating protein-protein recognition: ubiquitin and conformational selection.
3. 54th ENC Conference, Asilomar Conference Grounds, Pacific Grove, CA, April 14-19, 2013: Direct observation of correlated protein motions.
4. 2nd Gateway NMR Meeting, The Ohio State University, Columbus, OH, November 4, 2017: Determining conformational ensembles that encode functional dynamics: paving the way forward for their application to Human Guanylate Kinase

Local/Regional Meetings

1. IMD3 Fall Fest, Louisville, KY, November 30th, 2007: Analysis of GpIb α (269-286) peptide interactions with thrombin's anion binding exosite II.
2. Chicago Area NMR Discussion Group, Lake Bluff, IL, November 7th, 2015: Population shuffling between ground and high energy excited states.
3. NMR Meeting, Louisville, KY, December 2nd, 2015: Population shuffling between ground and high energy excited states.

Invited Talk

1. Susan Fisher, Department of Cell & Tissue Biology, University of California, San Francisco, San Francisco, CA, June 12th, 2008: Perturbations in Protein Dynamics Associated with Ligand Binding to the Blood Coagulation Enzymes Thrombin and Factor XIII.
2. Richard Wittebort, Department of Chemistry, University of Louisville, Louisville, KY, January, 2014: Direct detection of long range correlated protein motions.
3. John Trent, Department of Medicine, University of Louisville, Louisville, KY, July, 2014: Direct detection of long range correlated protein motions.
4. Rafael Brüschweiler, The Ohio State University, Columbus, Ohio, May 26th 2016: Direct detection of functional conformational sub-states in proteins.

University of Louisville Departmental Seminars

1. Department of Biochemistry and Molecular Genetics, October 16th, 2016: 1. Direct Detection of Functional Conformational Sub-states in Proteins 2. Functional Impact of Human Guanylate Kinase Non-Synonymous Single Nucleotide Polymorphisms
2. James Graham Brown Cancer Center, October 18th, 2016: Functional Impact of Human Guanylate Kinase Non-Synonymous Single Nucleotide Polymorphisms

POSTERS

National/International Meetings

1. 18th Annual Symposium of the Protein Society, San Diego, CA, August 14-18, 2004
 - a. **Sabo, T. M.**, Farrell, D. H., and Maurer, M. C. Characterizing the binding of fibrinogen γ' (410-427) to thrombin anion binding exosite II by solution NMR methods. *Protein Sci.* S13:204.
 - b. Turner, B. T., Jr., **Sabo, T. M.**, Wilding, D., and Maurer, M. C. Mapping the solvent accessibility of Factor XIII as a function of activation state using chemical modification methods. *Protein Sci.* S13:89.
2. 19th Annual Symposium of the Protein Society, Boston, MA, July 30-August 3, 2005
 - a. **Sabo, T. M.** and Maurer, M. C. Evaluating the binding of the γ' Peptide (410-427) and the effects of [NaCl] on thrombin solvent accessibility using HDX MALDI-TOF MS.
3. 20th Annual Symposium of the Protein Society, San Diego, CA, August 5-9, 2006
 - a. **Sabo, T. M.**, Brasher, P. B., and Maurer, M. C. Differences in solvent accessibility that occur to FXIIIa in the presence of active site directed ligands.
4. FASEB Summer Research Conference: Proteases in Hemostasis and Vascular Biology, Indian Wells, CA, June 2-7, 2007
 - a. **Sabo, T. M.** and Maurer, M. C. Biophysical analysis of GpIb α (269-286) peptide interactions with thrombin's anion binding exosite II.
5. 21st Annual Symposium of the Protein Society, Boston, MA, July 21-25, 2007
 - a. **Sabo, T. M.** and Maurer, M. C. Biophysical analysis of GpIb α (269-286) peptide interactions with thrombin's anion binding exosite II.

6. 1st International Conference on Molecular Recognition, Hereklion, Crete, Greece, June 6-11, 2010
 - a. **Sabo, T. M.**, Walter, K., Lakomek, N-A, Funk, M., Fares, C., Egger, D., Fenwick, R. B., Giller, K., de Groot, B. L., Lange, O. F., Grubmüller, H., Salvatella, X., Kree, R., Gulich, R., Meiler, J., Loidl, A., Lunkenheimer, P., Becker, S. Lee, D., and Griesinger C. Investigating protein-protein recognition: ubiquitin and conformational selection.
7. Joint EUROMAR and 17th ISMAR Conference, Florence, Italy, July 4-9, 2010
 - a. **Sabo, T. M.**, Walter, K., Giller, K., Becker, S., Lee, D., and Griesinger, C. Correlated motion in the protein core: implications for protein recognition.
8. Gordon Research Conference on Computational Aspects: Biomolecular NMR, Barga, Italy, May 22-27, 2011
 - a. Ban, D., Funk, M., Gulich, R., Egger, D., **Sabo, T. M.**, Walter, K. F. A., Fenwick, R. B., Giller, K., Pichierri, F., de Groot, B. L., Lange, O. F., Grubmüller, H., Salvatella, X., Wolf, M., Loidl, A., Kree, R., Becker, S., Lakomek, N. A., Lee, D., Lunkenheimer, P., and Griesinger, C. Kinetics of conformational sampling in ubiquitin and the molecular recognition process.
9. Barcelona BioMed Conferences: Macromolecular Dynamics, Barcelona, Spain, October 24-26, 2011
 - a. Ban, D., **Sabo, T. M.**, Giller, K., Becker, S., Lee, D., and Griesinger, C. Measuring the kinetics of conformational sampling during binding with NMR spectroscopy.
10. 26th Annual Symposium of the Protein Society, San Diego, CA, July 5-8, 2012
 - a. **Sabo, T. M.**, Fenwick, R. B., Walter, K. F. A., Schwiegk, C., Becker, S., Salvatella, X., Griesinger, C., and Lee, D. Direct observation of correlated protein motions detected by NMR spectroscopy. *Protein Sci.* S21:190.
 - b. **Sabo, T. M.**, Bakhtiari, D., Walter, K. F. A., McFeeters, R. L., Giller, K., Becker, S., Griesinger, C., and Lee, D. Thermal coefficients of methyl groups within ubiquitin. *Protein Sci.* S21:190.
 - c. **Sabo, T. M.**, Carneiro, M., Koharudin, L. M. I., Ban D., Mazur, A., Griesinger, C., Gronenborn, A., and Lee, D. N-glycan Recognition by the Cyanobacterial *Oscillatoria aghardii* lectin. *Protein Sci.* S21:209-10.
 - d. Ban, D., **Sabo, T. M.**, Giller, K., Becker, S., Lee, D., and Griesinger, C. Measuring the kinetics of conformational sampling during binding with NMR spectroscopy. *Protein Sci.* S21:146.
11. 25th ICMRBS Conference, Lyon, France, August 19-24, 2012
 - a. **Sabo, T. M.**, Fenwick, R. B., Walter, K. F. A., Schwiegk, C., Becker, S., Salvatella, X., Griesinger, C., and Lee, D. Direct observation of correlated protein motions detected by NMR spectroscopy.
 - b. Ban, D., **Sabo, T. M.**, Gossert, A., Fenwick, R. B., Walter, K. F. A., Giller, K., Schwiegk, C., Beinsen, A., Becker, S., de Groot, B., Techert, S., Salvatella, X., Lee, D., and Griesinger, C. Correlated protein and nanosecond to microsecond protein motion.
 - c. Bakhtiari, D., **Sabo, T. M.**, Walter, K. F. A., McFeeters, R. L., Giller, K., Becker, S., Griesinger, C., and Lee, D. Thermal coefficients of methyl groups within ubiquitin.

- d. Carneiro, M., Koharudin, L. M. I., Ban D., **Sabo, T. M.**, Mazur, A., Griesinger, C., Gronenborn, A., and Lee, D. N-glycan Recognition by the Cyanobacterial *Oscillatoria aghardii* lectin.
12. 54th ENC Conference, Asilomar Conference Grounds, Pacific Grove, CA, April 14-19, 2013
- a. **Sabo T.M.**, Fenwick R.B., Walter K.F.A., Schwiegk C., Becker S., Salvatella X., Griesinger C. and Lee D. Direct observation of correlated protein motions.
13. 27th ICMRBS Conference, Kyoto, Japan, August 21-26, 2016
- a. Gapsys V., Pratihari S., Pillay S., Giller K., Becker S., de Groot B.L., Lee D., Griesinger C. and **Sabo T.M.** Direct detection of functional conformational sub-states in proteins.
- b. Pratihari S., **Sabo T.M.**, Ban D., Fenwick R.B., Becker S., Salvatella X., Griesinger C. and Lee, D. Kinetics of the antibody recognition site in the third IgG-binding domain of protein G.
14. 30th Gibbs Conference, Carbondale, IL, September 24-27, 2016
- a. Gapsys V., Pratihari S., Pillay S., Giller K., Becker S., de Groot B.L., Lee D., Griesinger C. and **Sabo T.M.** Direct detection of functional conformational sub-states in proteins.

PUBLICATIONS

Articles Published in Peer-Reviewed Journals

1. Turner B.T., **Sabo T.M.**, Wilding D. and Maurer M.C. Mapping of factor XIII solvent accessibility as a function of activation state using chemical modification methods. *Biochemistry* 43:9755-65, 2004.
2. **Sabo T.M.**, Farrell D.H. and Maurer M.C. Conformational analysis of γ' peptide (410-427) interactions with thrombin anion binding exosite II. *Biochemistry* 45:7434-45, 2006.
3. **Sabo T.M.**, Brasher P.B. and Maurer M.C. Perturbations in Factor XIII resulting from activation and inhibition examined by solution based methods and detected by MALDI-TOF MS. *Biochemistry* 46:10089-101, 2007.
4. Cleary D.B., Doiphode P.G., **Sabo T.M.** and Maurer, M.C. A non-reactive glutamine residue of α_2 -antiplasmin promotes interactions with the factor XIII active site region. *J. Thromb. Haemost.* 7:1947-9, 2009.
5. **Sabo T.M.** and Maurer M.C. Biophysical investigation of GpIb α binding to thrombin anion binding exosite II. *Biochemistry* 48:7110-22, 2009.
6. Ban D., Funk M., Gulich R., Egger D., **Sabo T.M.**, Walter K.F.A., Fenwick R.B., Giller K., Pichierri F., de Groot B.L., Lange O.F., Grubmüller H., Salvatella X., Wolf M., Loidl A., Kree R., Becker S., Lakomek N.A., Lee D., Lunkenheimer P. and Griesinger C. Kinetics of conformational sampling in ubiquitin. *Angew. Chem. Int. Ed.* 50:11437-40, 2011.
7. **Sabo T.M.**, Bakhtiari D., Walter K.F.A., McFeeters R.L., Giller K., Becker S., Griesinger C. and Lee D. Thermal coefficients of the methyl groups within ubiquitin. *Protein Sci.* 21:562-70, 2012.
8. Malovichko M.V., **Sabo T.M.** and Maurer M.C. Ligand binding to anion binding exosites regulates conformational properties of thrombin. *J. Biol. Chem.* 288:8667-78, 2013.

9. Ban D., Mazur A., Carneiro M.G., **Sabo T.M.**, Giller K., Koharudin L.M.I., Becker S., Gronenborn A.M., Griesinger C. and Lee D. Enhanced accuracy of kinetic information from CT-CPMG experiments by transverse rotating-frame spectroscopy. *J. Biomol. NMR*. 57:73-82, 2013.
10. **Sabo T.M.**, Smith C.A., Ban D., Mazur A., Lee D. and Griesinger C. ORIUM: Optimized RDC-based Iterative and Unified Model-free analysis. *J. Biomol. NMR*. 58:287-301, 2014.
11. Bibow S., Carneiro M.G., **Sabo T.M.**, Schwiegk C., Becker S., Riek R. and Lee D. Measuring membrane protein bond conformations in nanodiscs via residual dipolar couplings. *Protein Sci*. 23:851-6, 2014.
12. Michielssens S., Peters J.H., Ban D., Pratihari S., Seeliger D., Sharma M., Giller K., **Sabo T.M.**, Becker S., Lee D., Griesinger C. and de Groot B.L. A designed conformational shift to control protein binding specificity. *Angew. Chem. Int. Ed*. 53:10367-71, 2014.
13. Kim D.H., Lee C., Cho Y.J., Lee S.H., Cha E.J., Lim J.E., **Sabo T.M.**, Griesinger C., Lee D. and Han K.H. A pre-structured helix in the intrinsically disordered 4EBP1. *Mol. Biosyst*. 11:366-9, 2015.
14. Carneiro M.G., Koharudin L.M., Ban D., **Sabo T.M.**, Trigo-Mourino P., Mazur A., Griesinger C., Gronenborn A.M. and Lee D. Sampling of Glycan-Bound Conformers by the Anti-HIV Lectin *Oscillatoria agardhii* agglutinin in the Absence of Sugar. *Angew. Chem. Int. Ed*. 54:6462-5, 2015.
15. **Sabo T.M.***, Trent J.O. and Lee D*. Population Shuffling between ground and high energy excited states. *Protein Sci*. 24:1714-9, 2015.
16. Pratihari S., **Sabo T.M.**, Ban D., Fenwick R.B., Becker S., Salvatella X., Griesinger C. and Lee D. Kinetics of the antibody recognition site in the third IgG-binding domain of protein G. *Angew. Chem. Int. Ed*. 55: 9567-9570, 2016.
17. Billur R., Ban D., **Sabo T.M.**, and Maurer M.C. Deciphering Conformational Changes Associated with the Maturation of Thrombin Anion Binding Exosite I. *Biochemistry* 56:6343-54, 2017.
18. Khan N., Ban D., Trigo-Mourino P., Carneiro M.G., Konrad M., Lee D. and **Sabo T.M.*** ¹H, ¹³C and ¹⁵N resonance assignment of human guanylate kinase. *Biomol. NMR Assign*. 12:11-4, 2018.
19. **Sabo T.M.***, Gapsys V., Walter K.F.A., Fenwick R.B., Becker S., Salvatella X., de Groot B.L., Lee D., and Griesinger C. Utilizing dipole-dipole cross-correlated relaxation for the measurement of angles between pairs of opposing CaH α -CaH α bonds in anti-parallel β -sheets. *Methods*. 138:85-92, 2018.

*as corresponding author

underline: shared first author

Review Articles Published in Peer-Reviewed Journals

1. Ban D., **Sabo T.M.**, Griesinger C. and Lee D. Measuring dynamic and kinetic information in the previously inaccessible supra- τ_c window of nanoseconds to microseconds by solution NMR spectroscopy. *Molecules* 18:11904-37, 2013.