Joanna S.G. Slusky

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Appointments

University of Kansas	
Associate Professor of Molecular Biosciences	2020 – present
Associate Professor of Computational Biology	2020 – present
Docking Family Scholar	2017 – present
Assistant Professor of Molecular Biosciences	2014 – 2020
Assistant Professor of Computational Biology	2014 – 2020

Academic training

Postdoctoral Fellow 2012 – 2014
Advisor: Roland L. Dunbrack Jr.
Fox Chase Cancer Center: Institute for Cancer Research
NIH postdoctoral research training grant

Postdoctoral Fellow 2008 – 2012
Advisor: Gunnar von Heijne
Stockholm University: Biochemistry and Biophysics
Human Frontier Science Program postdoctoral fellow

Ph.D. in Biochemistry and Biophysics, University of Pennsylvania Dec. 2007
Advisor: William F. DeGrado
NSF Graduate Research Fellow

A.B. in Chemistry, *Magna Cum Laude*. Princeton University May 2001
Advisor: Robert J. Cava
Minor in Material Science and Engineering.

Manuscripts under review`

1. S.J. Budiardjo, J. Stevens, A. Caulkins, A.P. Ikujuni, V. Wimalasena, E. Firlar, D.A. Case, J.S. Biteen, J.T. Kaelber, **J.S.G. Slusky**, "Colicin E1 opens its hinge to plug TolC". *Submitted 2019* [BioRXiv]
2. M.W. Franklin, J.J. Stevens, J. Krise, **J.S.G. Slusky**, "The Extracellular Loops of OmpA Control the Slow Rate of *In Vitro* Folding". *Submitted 2020* [BioRXiv]

Peer-Reviewed Publications

3. R. Feehan* M.W. Franklin*, **J.S.G. Slusky**. "Machine Learning Differentiates Enzymatic and Non-Enzymatic Metals in Proteins". *Nature Communications* 12:1 3712 (2021) [*co-first authors] [Nature Communications]

4. R. Feehan*, D. Montezano*, **J.S.G Slusky**. "Machine Learning for Enzyme Engineering, Selection, and Design". *Protein Engineering Design and Selection* 34 (2021) [*co-first authors] [PEDS]
5. R. Dhar, R. Feehan, **J.S.G. Slusky**. "Membrane Barrels Are Taller, Fatter, Inside-Out Soluble Barrels". *Journal of Physical Chemistry B* 125:14, 3622 (2021) [JoPCB]
6. S.J. Budiardjo*, A.I. Ikujuni*, E. Firlar, A. Cordova, J.T. Kaelber, **J.S.G. Slusky**, "High Yield Preparation of Outer-Membrane Protein Efflux Pumps by *In Vitro* Refolding is Concentration Dependent. *Journal of Membrane Biology* (2021) [*co-first authors] [JMBi]
7. R. Dhar, **J.S.G. Slusky**. "Outer Membrane Protein Evolution." *Current Opinion in Structural Biology* (2021) [CurOpStructBio]
8. Tan, S.K., Fong, K.P., Polizzi, N.F., Sternisha, A., **Slusky, J.S.G.**, Yoon, K., Degrado, W.F., Bennett, J.S. "Modulating Integrin αIIbβ3 Activity through Mutagenesis of Allosterically Regulated Inter-subunit Contacts" *Biochemistry* 58, 3251−3259 (2019) [Biochemistry]
9. M.W. Franklin, S. N. Nepomnyachiy, R. Feehan, N. Ben-Tal, R. Kolodny, **J.S.G. Slusky**. "Evolutionary pathways of repeat protein topology in bacterial outer membrane proteins" *eLife* 7:e40308 (2018) [eLife] [eLife Insight]
10. M.W. Franklin, S. N. Nepomnyachiy, R. Feehan, N. Ben-Tal, R. Kolodny, **J.S.G. Slusky**. "Efflux Pumps Represent Possible Evolutionary Convergence onto the Beta Barrel Fold" *Structure* 26(9):1266-74 (2018) [Structure] [very good by F1000] [cover image Sept 2018]
11. M.W. Franklin, **J.S.G. Slusky**. "Tight Turns of Outer Membrane Beta-Barrels: An Analysis of Sequence, Structure, and Hydrogen Bonding" *Journal of Molecular Biology* 430(18B):3251-65 (2018) [JMB]
12. **J.S.G. Slusky** "Outer membrane protein design." *Current Opinion in Structural Biology* 54:45-52 (2017) [CurrOpStructBio]
13. S. Kim, D.S. Patel, S. Park, **J.S.G. Slusky**, J.B. Klauda, G. Widmalm, W. Im. "Bilayer Properties of Lipid A from Various Gram-Negative Bacteria". *Biophysical Journal* 111(8):1750-60 (2016) [BJ]
14. **J.S.G. Slusky*** and R.L. Dunbrack. "Charge asymmetry in proteins of the outer membrane." *Bioinformatics* 29(17):2122-8 (2013) ***corresponding author** [Bioinformatics]
15. P. Lloris-Garcerá, S. Seppälä, **J.S.G. Slusky**, M. Rapp, G. von Heijne. "Why Have Small Multidrug Resistance Proteins Not Evolved into Fused, Internally Duplicated Structures?" *Journal of Molecular Biology* 426(11):2246-54 (2014) [JMB]
16. P. Lloris-Garcerá, **J.S.G. Slusky**, S. Seppälä, M. Prieß, L. V. Schäfer, G.von Heijne. "In vivo Trp-scanning of the Small Multidrug Resistance protein EmrE confirms anti-parallel 3D structure models." *Journal of Molecular Biology* 425(22):4642-51 (2013) [JMB]
17. P. Lloris-Garcerá, F. Bianchi, **J.S.G. Slusky**, S. Seppälä, D.O. Daley, G.von Heijne. "Antiparallel dimers of the small multidrug-resistance protein EmrE are more stable than parallel dimers*." Journal of Biological Chemistry* 287(31):26052-9 (2012) [JBC]
18. S.E. Dutton, E.D. Hanson, C.L. Broholm, **J.S. Slusky**, R.J Cava. "Magnetic properties of hole-doped SCGO, SrCr(8)Ga(4-x)M(x)O(19) (M=Zn, Mg, Cu)." *Journal of physics--Condensed matter,* 23(38):386001, (2011) [JoP:CM]
19. S. Seppälä, **J.S. Slusky**, P. Lloris-Garcerá, M. Rapp, G.von Heijne. "Control of membrane protein topology by a single C-terminal residue." *Science* 328(5986):1698-700, (2010. [Science]

20. **J.S. Slusky**, H. Yin, W.F. DeGrado "Understanding membrane proteins: How to design inhibitors of transmembrane protein-protein interactions." *Protein Engineering* (C. Köehrer, U.L. RajBhandary; Ed.), Springer Verlag, 22, 315-338 (2009). [Springer]
21. H. Yin*, **J.S. Slusky***, B.W. Berger, R.S. Walters, G. Vilaire, R.I. Litvinov, J. D. Lear, G.A. Caputo, J.S. Bennett, W.F. DeGrado. "Computational Design of Peptides that Target Transmembrane Helices" *Science* 315(5820):1817 (2007) ***co-first authors** [Science]
22. J. Snyder, B.G Ueland, **J.S. Slusky**, H. Karunadasa, R.J.Cava, P. Schiffer. "Low-temperature spin freezing in the $Dy_2Ti_2O_7$ spin ice." *Physical Review B: Condensed Matter and Materials Physics* 69(6):064414, (2004) [PRB]
23. J. Snyder, B.G. Ueland, A. Mizel, **J.S. Slusky**, H. Karunadasa, R.J. Cava, P. Schiffer. "Quantum and thermal spin relaxation in the diluted spin ice $Dy_{2-x}M_xTi_2O_7$ (M=Lu,Y)." *Physical Review B: Condensed Matter and Materials Physics* 70(18):184431, (2004). [PRB]
24. T.W. Heitmann, S.D. Bu, D.H. Kim., J.H. Choi, J. Giencke, C.B. Eom, K.A. Regan, N. Rogado, M.A. Hayward, T. He, **J.S. Slusky**, P. Khalifah, M. Haas, R.J. Cava, D.C. Larbalestier, M.S. Rzchowski. "MgB2 energy gap determination by scanning tunnelling spectroscopy." *Superconductor Science & Technology: Suppl S.* 17(2):237, (2004). [SS&T]
25. J. Snyder, B.G. Ueland, **J.S. Slusky**, H. Karunadasa, R.J.Cava, A. Mizel, P. Schiffer, "Quantum-classical reentrant relaxation crossover in $Dy_2Ti_2O_7$ spin ice." *Physical Review Letters* 91(10):107201, (2003). [PRL]
26. J. Snyder, **J.S. Slusky**, R.J. Cava, P.Schiffer, "Dirty spin ice: The effect of dilution on spin freezing in Dy2Ti2O7." *Physical Review B: Condensed Matter and Materials Physics* 66(6):064432, (2002). [PRB]
27. **J. S. Slusky**, N. Rogado, K. A. Regan, M. A. Hayward, P. Khalifah, T. He, Inumaru, S. M. Loureiro, M. K. Haas, H. W. Zandbergen, R. J. Cava. "Loss of superconductivity with the addition of Al to MgB2 and a structural transition in Mg1-xAlxB2." *Nature* 410(4826):343-5, (2001). [Nature]
28. J. Snyder, **J.S. Slusky**, R.J. Cava, P. Schiffer. "How 'spin ice' freezes." *Nature* 413(6851):48-51, (2001). [Nature]
29. D.C. Larbalestier, L.D. Coolye, M.O. Rikel, A.A. Polyanskii, J. Jiang, S. Patnaik, X.Y. Cai, D.M. Feldmann, A Gurevich, AA Squirieri, M.T. Naus, C. B. Eom, E.E. Hellstrom, R. J. Cava, K. A. Regan, N. Rogado, M.A. Hayward, T. He, **J.S. Slusky**, P. Khalifah, K. Inumaru, M. Haas. "Strongly linked current flow in polycrystalline forms of the superconductor MgB_2." *Nature* 410(6825):186-9, (2001). [Nature]
30. C.B. Eom, M.K. Lee, J.H. Choi, L. Belenky, X. Song, L.D. Cooley, M.T. Naus, S. Patnaik, J. Jiang, M. Rikel, A. Polyanskii, A. Gurevich, X.Y. Cai, S.D. Bu, S.E. Babcock, E.E. Hellstrom, D.C. Larbalestier, N. Rogado, K.A. Regan, M.A. Hayward, T. He, **J.S. Slusky**, K. Inumaru, M.K. Haas, R.J. Cava. "High critical current density and enhanced irreversibility field in superconducting MgB2 thin films." *Nature* 411(6837):558-60, (2001). [Nature]
31. T. He, Q. Huang, A.P. Ramirez, Y. Wang, K.A. Regan, N. Rogado, M.A. Hayward, M.K. Haas, **J.S. Slusky**, K. Inumara, H.W. Zandbergen, N.P. Ong, and R.J. Cava. "Superconductivity in the non-oxide perovskite MgCNi3." *Nature* 411(6833):54-6 (2001). [Nature]
32. T. Yildirium, O. Gulseren, J.W. Lynn, C.M. Brown, T.J. Udovic, Q. Huang, N. Rogado, K.A. Regan, M.A. Hayward, **J.S. Slusky**, T.He, M.K. Haas, P. Kalifah, K. Inumaru, and R.J. Cava. "Giant anharmonicity and nonlinear electron-phonon coupling in MgB2: a combined

first-principles calculation and neutron scattering study." *Physical Review Letters* 87(3):037001, (2001). [PRL]

Patents and patents under review

1. **J.S. Slusky**, H. Yin, W.F. DeGrado. "Polypeptides That Bind Membrane Proteins." United States Patent. US 2010-0120695-A1 (2010). [GooglePatents]
2. **J.S.G. Slusky** "Targeting the formation of Beta Barrels". United States Patent Application 1549605. Filing date: 4/27/2017

Awards

- Johnson and Johnson STEM2D Scholars Award, Finalist (2019)
- Sigma Xi Student Invited Outstanding Scientist Award, Kansas State University (2018)
- NIH Director's New Innovator Award (2017)
- Moore Inventor Fellowship (2016)
- F1000 Outstanding Presentation Prize 3Dsig (2016)
- University of Pennsylvania: Biomedical Graduate Studies Director's Award (2002)
- Princeton University: Malcolm H. Chisholm prize for student who displayed the most excellence in inorganic chemistry in the class of 2001
- Semifinalist Westinghouse Science Talent Search (1997)

Major Fellowships and Grants

NIH DP2 GM128201 Slusky (PI) 09/30/17-05/30/22
Designed Beta-Strands for Inhibiting Efflux Pumps and Disabling Antibiotic Resistance
Role: PI direct costs: $1,500,000

Moore Inventor Fellowship Slusky (PI) 11/01/17-12/31/19
Peptides That Bind To Outer Membrane Beta Barrels
Role: PI direct costs: $750,000

NIH P20GM113117 Slusky (Junior Investigator) 08/28/16-05/01/17
This CoBRE award for Chemical Biology of Infectious Diseases funds multiple projects in Kansas.
Targeting TolC oligomerization to potentiate antibiotics
Role: Project PI direct costs for Slusky lab: $140,000

NIH P20GM103418 Slusky(Project Award) 05/01/16-08/27/16
This Kansas-INBRE award funds research within the theme of cell and developmental biology
Targeting TolC oligomerization to potentiate antibiotics
Role: Development Project Research Grant direct costs for Slusky lab: $75,000

—Before arriving at KU in summer 2014—
- NIH postdoctoral research training grant (2012-2014)
- HFSP (Human Frontier Science Program) Long Term Research Fellow (2008-2011)
- NIH Structural Biology Training Grant (2005-2007)

- NSF Graduate Research Fellowship (2002-2005)
- New Jersey Commission on Cancer Research, Summer Fellow (1997)

Talks and Invited Seminars:

- Invited Seminar: University of Kansas Cancer Center, Kansas City, KS via Zoom (June 2021)
- Invited Seminar: Lehigh University Chemistry Department, Lehigh, PA via Zoom (April 2021)
- Invited Speaker: Bacterial Cell Envelopes: Structure, Dynamics, and Function, Southampton, UK via Zoom (March 2021)
- PEDS: Protein Engineering Design and Selection Webinar series (September 2020) [youtube 7:00-32:00]
- Translocation Transfer Seminar Series, Bremen, Germany via Zoom (Aug. 2020)
- Accepted presentation: International Society for Computational Biology (ISCB) international meeting 3DSig (structural biology track) Zoom (July 2020)
- Invited Seminar: Rutgers University Center for Advancement of Bio-Medicine Piscataway, NJ (February 2020)
- Invited Seminar: NIH NIDDK, Bethesda, MD (January 2020)
- Invited Speaker: Midwest Regional Meeting of American Chemical Society, Witchita, KS (October 2019)
- Invited Seminar: Rutgers University Chemistry Department, Piscataway, NJ (September 2019)
- Selected Speaker: RosettaCON, Levenworth, WA (August 2019)
- Invited Speaker: GRC Membrane Protein Folding, Easton, MA (July 2019)
- Invited Seminar: NIH membrane interest group, Bethesda, MD (March 2019)
- Invited Seminar: University of Wisconsin Madison, Biochemistry Colloquium, Madison, WI (February, 2019)
- Keynote Speaker: How Did Proteins Emerge and Continue to Evolve Meeting, Haifa, Israel (February 2019)
- Invited Seminar: Physics Seminar Series, University of Missouri, Columbia, MO (February 2019)
- Invited Speaker: Modeling of Protein Interactions, Lawrence, KS (November 2018)
- Invited Seminar: Chemical and Structural Biology and Biophysics Research Series, The Ohio State University, Columbus, OH (October 2018)
- Invited Speaker: Protein Design and Engineering conference, Frankfurt, Germany (October 2018)
- Invited Seminar: Vanderbilt Structural Biology symposium, Nashville, TN (September 2018)
- Invited Speaker: EMBO workshop mPEPC1 Hamburg, Germany (September 2018)
- Selected Speaker: Protein Society Annual Symposium, Boston, MA (July 2018)
- Student Invited Speaker: Sigma Xi, Scientific Research Society, Manhattan, KS (April 2018)
- Invited Speaker: Eclipse Symposium on Membrane Proteins, Manhattan KS (August 2017)
- Invited Speaker: Workshop: Structural biology Stockholm, Sweden (January 2017)
- Invited Speaker: Modeling of Protein Interactions, Lawrence, KS (October 2016)
- Selected Speaker: FASEB: Molecular Biophysics of Membranes, Snowmass, CO (July 2016)
- Invited Seminar: Rutgers University, Piscataway, NJ (June 2016)
- Invited Seminar: University of Missouri, Kansas City, Kansas City, MO (November 2015)
- Invited Speaker: GRC Membrane Protein Folding, Waltham, MA (June 2015)
- Invited Seminar: Stockholm University, Stockholm, Sweden (June 2015)
- Invited Seminar: University of Kansas Medical Center, Kansas City, KS (December 2014)

- Invited Seminar: Kansas State, Manhattan, Kansas (November 2014)
- Invited Speaker: Modeling of Protein Interactions, Lawrence, KS (October 2014)

Teaching (all classes are co-taught)

Classes:

BIOL 636 Introduction to Biochemistry I	Fall, 2015 – present
BINF 701 Computational Biology Core Course I	Fall, 2015 – 2017, 2019 – present
BINF 702 Computational Biology Core Course II	Spring, 2016 – present
BINF 709 Topics in Bioinformatics	Fall & Spring, 2015 – present
BIOL 750 Graduate Advanced Biochemistry	Spring, 2016 – present

Postdoctoral Fellows:

Huisun Lee	2016 – 2017
Pinakin Sukthankar	2015 – 2019
Daniel Montezano	2019 – present
Jimmy Budiardjo	2019 – present

Graduate Students:

Meghan Franklin	2015 – 2019
Jaden Anderson	2016 – 2021
Rik Dhar	2016 – present
S. Jimmy Budiardjo	2017 – 2019
Paul Ikujuni	2019 – present
Ryan Feehan	2019 – present
Samuel Lim	2021 – present

Post Baccalaureate Students:

Aldo Salazar Morales	2017 – 2018
Dennis Perez-Lopez	2018 – 2019

Undergraduate Students:

Shannon James	2014 – 2016
Ryan Feehan	2015 – 2017
Cedric Clark	2015 – 2017
Aleksander Downs	2015 – 2018
Paul Goodman III	Summer 2015
Riel Latimer	2016 – 2017
Virangika Wimalasena	2017 – 2018
Brooke Wietharn	2018 – 2019
Gustavo Murillo-Espinoza	2018 – 2020
Jenna Gardener	2019 – 2020
Andres Cordova	2020 – 2021
Justin Lerma	Summer 2020
Sarah Noga	2020 – present
Gabrielle Martell	2021– present

Brunojoel Hatungimana 2021– present

High School Students:
Arrihant Kanna summer 2017
Rebecca Bernstein 2020 – 2021

Graduate Committees:
Past:
1. Xi Cheng, Computational Biology, 2015
2. Ragul Gowthaman, Computational Biology, 2015
3. Varsha Badal, Computational Biology, 2015 – 2018
4. Saveliy Belkin, Computational Biology, 2015 – 2019
5. Shipra Malhotra, Computational Biology 2015 – 2019
6. Jittasak Khowsathit, Computational Biology 2015 – 2019
7. Jiaqin Li, Molecular Biosciences, 2016
8. Jumin Lee, Computational Biology 2016 – 2017
9. Elizabeth Grotemeyer, Molecular Biosciences 2016 – 2018
10. Sijin Ren, Chemistry, 2017
11. Shoichi Tachiyama, Molecular Biosciences, 2018 – 2019
12. Nikola Kenjic, Molecular Biosciences 2015 – 2019
13. Nan Bai, Molecular Biosciences, 2015 – 2019
14. Victor Vasquez Montes, Biochemistry and Molecular Biology at KUMC, 2015 – 2020
15. Huijing Wang, Computational Biology, 2016 – 2020
16. GW McElfresh, Computational Biology, 2017 – 2020
17. Dwight Deay, Molecular Biosciences, 2015 – 2021
18. Anupama Kante, Molecular Biosciences 2016 – 2021
19. Pushpa Itagi, Computational Biology, 2016 – 2021
20. Amritangshu Chakravarty, Molecular Biosciences, 2017 – 2021

Current:
1. Nathan Jenkins, Computational Biology, 2017 – present
2. Alexander Bowman, Molecular Biosciences, 2017 – present
3. Anna Clompen, Ecology and Evolutionary Biology, 2018 – present
4. Ian Kotthoff, Compuational Biology, 2019 – present
5. Apurba Bhattarai, Computational Biology, 2020 – present

Service

Service to the field
- Associate Editor: *PLoS Computational Biology*
- Co-Chair of Nominating committee: Protein Society
- Editorial advisory board: PEDS: *Protein, Engineering, Design, and Selection*
- Co-chairing Biophysical Society Thematic Meeting "Physical and Quantitative Approaches to Overcome Antibiotic Resistance" Stockholm, Sweden (Aug. 2022)
- Associate Editor: *Journal of Membrane Biology*
- Rosetta membership committee member

- Journal Reviewer for:

BBA-biomembranes	*Environmental*	*PLoS Comp Biology*
Biochemistry	*Microbio*	*PNAS*
Biochimie	*Journal of Comp Chem*	*Proteins*
Biophysical Journal	*Molecular BioSystems*	*Scientific Reports*
BMC Structural	*Molecular*	*Trends in*
Biology	*Microbiology*	*Biotechnology*
Chemical Reviews	*Oncotarget*	

- Grant reviewer*:* Biotechnology and Biological Research Sciences (UK), Swiss National Science Foundation, National Science Centre in Poland

Promoting Science in High Schools

- Consultant: Students Modeling A Research Topic (SMART) team, Olathe North, KS, 2017
- Consultant: Olathe North, KS high school for the Science Olympiad, winter 2015
- Presentation: "How to Become a Scientist" to 9th graders in Overland Park, KS, April 2018
- Chemistry Demonstration for K-12 STEM fair Overland Park, KS March, 2019