

DAVID W. SANDERS, PHD

Assistant Professor (Tenure-Track)

University of Texas Southwestern Medical Center

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EDUCATION

WASHINGTON UNIVERSITY SCHOOL OF MEDICINE, St. Louis, MO 2010-2016
Doctor of Philosophy (Ph.D.) in Neurosciences

UNIVERSITY OF KANSAS, Lawrence, KS 2005-2009
Bachelor of Science in Neurobiology, Bachelor of General Studies in Psychology
Honors Program (National Merit Scholar), Graduation with Honors

PROFESSIONAL EXPERIENCE

UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER, Dallas, TX 2023 to present
Assistant Professor
Department of Molecular Biology
Center for Alzheimer's and Neurodegenerative Diseases
Peter J. O'Donnell Jr. Brain Institute

PRINCETON UNIVERSITY, Princeton, NJ 2016-2023
Postdoctoral Fellow
Advisor: Clifford P. Brangwynne, Ph.D.

WASHINGTON UNIVERSITY SCHOOL OF MEDICINE, St. Louis, MO 2010-2016
Graduate Student
Advisor: Marc I. Diamond, M.D.

UNIVERSITY OF KANSAS, Lawrence, KS 2010
Research Technician
Advisor: Brian D. Ackley, Ph.D.

RESEARCH INTERESTS

My laboratory's research seeks to understand how RNA/protein assemblies control cellular states, and how related pathways are hijacked by diseases of aging. As a member of the Center for Alzheimer's and Neurodegenerative Diseases, we are particularly interested in uncovering the role of RNA (dys)homeostasis in the pathogenesis of neuromuscular diseases. Toward this goal, the Sanders Lab uses diverse experimental approaches from *in vitro* reconstitution to mammalian cell culture, with an emphasis on quantitative live-cell microscopy and genomics. We are passionate advocates for curiosity-based scientific inquiry, in which hypotheses, independent of past successes (or failures), are rigorously tested using question-dependent methodologies. We embrace risk and seek fellow lab members who share our insatiable curiosity for discovery.

PUBLICATIONS

[Total Citations = 4830, h-index = 14, *Google Scholar*, July 2024] Highlight = First/senior author papers

SANDERS LAB RESEARCH (UT Southwestern)

19. **Sanders DW**, Wiesner L, Ghosh R, Jimenez M, Gupta A, Becker LA, Holehouse AS, Diamond MI, Brangwynne CP. A polyanionic disassembler of pathogenic tau inclusions and nuclear speckles. *In Preparation*.

POSTDOCTORAL RESEARCH (Princeton, Advisor: Cliff Brangwynne)

18. Choi CH, Lee DSW, **Sanders DW**, Brangwynne CP (2023). Condensate interfaces can accelerate protein aggregation. *Biophysical Journal* 123, 1404-1413.
[Citation Count: 6]
17. Park J, Wu Y, Shao W, Gendron TF, van der Spek SJF, Sultanakhmetov G, Basu A, Otero PC, Jones CJ, Jansen-West K, Daugherty LM, Phanse S, del Rosso G, Tong J, Castanedes-Casey M, Jiang L, Libera J, Oskarsson B, Dickson DW, **Sanders DW**, Brangwynne CP, Emili A, Wolozin B, Petrucelli L, Zhang Y-J (2023). Poly(GR) interacts with key stress granule factors promoting its assembly into cytoplasmic inclusions. *Cell Reports* 42, 112822.
[Citation Count: 8]
16. Lee DSW, Choi CH, **Sanders DW**, Beckers L, Riback JA, Brangwynne CP, Wingreen NS (2023). Size distributions of intracellular condensates reflect competition between coalescence and nucleation. *Nature Physics* 19, 586-596.
[Citation Count: 32]
15. **Sanders DW***, Jumper CC*, Ackerman PJ*, Bracha D, Donlic A, Kim H, Kenney D, Castello-Serrano I, Suzuki S, Tamura T, Tavares AH, Saeed M, Holehouse AS, Ploss A, Levental I, Douam F, Padera RF, Levy BD, Brangwynne CP (2022). SARS-CoV-2 requires cholesterol for viral entry and pathological syncytia formation. *eLife* 10, e65962. *These authors contributed equally.
[Citation Count: 186]
14. Shimobayashi SF, Ronceray P, **Sanders DW**, Haataja MP, Brangwynne CP (2022). Nucleation landscape of biomolecular condensates. *Nature* 599, 503-506.
[Citation Count: 135]

13. **Sanders DW**, Kedersha N, Lee DSW, Strom AR, Drake V, Riback JA, Bracha D, Eeftens JM, Iwanicki A, Wang A, Wei MT, Whitney G, Lyons SM, Anderson P, Jacobs WM, Ivanov P, Brangwynne CP (2020). Competing protein-RNA interaction networks control multiphase intracellular organization. *Cell* 181, 306-324. [Citation Count: 592]
12. Riback JA, Zhu L, Ferrolino MC, Tolbert M, Mitrea DM, **Sanders DW**, Wei MT, Kriwacki RW, Brangwynne CP (2020). Composition dependent thermodynamics of intracellular phase separation. *Nature* 581, 209-214. [Citation Count: 495]
11. Shin Y, Chang YC, Lee DSW, Berry J, **Sanders DW**, Ronceray P, Wingreen NS, Haataja M, Brangwynne CP (2018). Liquid nuclear condensates mechanically sense and restructure the genome. *Cell* 175, 1481-1491. [Citation Count: 589]
10. **Sanders DW** and Brangwynne CP (2017). Invited Commentary: RNA puts a freeze on cells. *Nature* 546, 215-216. [Citation Count: 12]

GRADUATE RESEARCH (Washington University in St. Louis, Advisor: Marc Diamond)

9. Perez VA, **Sanders DW**, Mendoza-Oliva A, Stopschinski BE, Mullapudi V, White CL, Joachimiak LA, Diamond MI. DnaJC7 specifically regulates tau seeding. *eLife* 12, e86936. [Citation count: 6]
8. Saha I, Yuste-Checa P, Padilha MDS, Guo Q, Korner R, Holthusen H, Trinkaus VA, Dudanova I, Fernandez-Busnadiego R, Baumeister W, **Sanders DW**, Gautam S, Diamond MI, Hartl FU, Hipp MS (2023). The AAA+ chaperone VCP disaggregates Tau fibrils and generates aggregate seeds in a cellular system. *Nature Communications* 14, 560. [Citation Count: 35]
7. Eskandari-Sedighi G, Daude N, Gapesina H, **Sanders DW**, Kamali-Jamil R, Yang J, Shi B, Wille H, Ghetti B, Diamond MI, Janus C, Westaway D (2017). The CNS in inbred transgenic models of 4-repeat tauopathy develops consistent tau seeding capacity yet focal and diverse patterns of protein deposition. *Molecular Neurodegeneration* 12, 72. [Citation Count: 17]
6. **Sanders DW***, Kaufman SK*, Holmes BB*, Diamond MI (2016). Invited Review: Prions and protein assemblies that convey biological information in health and disease. *Neuron* 89, 433-448. *These authors contributed equally. [Citation Count: 89]
5. Kaufman SK*, **Sanders DW***, Thomas TL, Ruchinkas AJ, Vaquer-Alicea J, Sharma AM, Miller TM, Diamond MI (2016). Tau prion strains dictate patterns of cell pathology, progression rate, and regional vulnerability in vivo. *Neuron* 92, 796-812. *These authors contributed equally. [Citation Count: 416]
4. Wu JW, Hussaini SA, Bastille IM, Rodriguez GA, Mrejeru A, Rilett K, **Sanders DW**, Cook C, Fu H, Boonen RA, Herman M, Nahmani E, Emrani S, Figueroa YH, Diamond MI, Clelland CL, Wray S, Duff KE (2016). Neuronal activity enhances tau propagation and tau pathology in vivo. *Nature Neuroscience* 19, 1085-1092. [Citation Count: 706]
3. Mirbaha H, Holmes BB, **Sanders DW**, Bieschke J, Diamond MI (2015). Tau trimers and larger assemblies are internalized and seed intracellular aggregation. *Journal of Biological Chemistry* 290, 14893-903. [Citation Count: 239]

2. Woerman AL, Stöhr J, Aoyagi A, Rampersaud R, Krejciova Z, Watts J, Ohyama T, Patel S, Widjaja K, **Sanders DW**, Diamond MI, Seeley WW, Middleton LT, Gentleman SM, Mordes DA, Sudhof TC, Giles, Prusiner SB (2015). Propagation of prions causing synucleinopathies in cultured cells. *PNAS* 112, E4948-58. [Citation Count: 247]
 1. **Sanders DW***, Kaufman SK*, DeVos SL, Sharma AM, Mirbaha H, Li A, Barker SJ, Foley AC, Thorpe JR, Serpell LC, Miller TM, Grinberg LT, Seeley WW, Diamond MI (2014). Distinct tau prion strains propagate in cells and mice and define different tauopathies. *Neuron* 82, 1271-1288. *These authors contributed equally. [Citation Count: 1018]
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PATENTS

3. Synthetic peptides for dissolving tau inclusions [18/124,252; Filed 2023-03-21, Pending]
Co-Inventors: Clifford P. Brangwynne, **David W. Sanders**
 2. System and method for light-regulated oligomerization and phase separation of folded domains and RNA granule-associated protein domains for drug-based screening applications. [17/432,145; Filed 2020-02-19, Pending]
Co-Inventors: Clifford P. Brangwynne, Dan Bracha, Victoria Drake, **David W. Sanders**
 1. System and method for modulating stress granule assembly [17/258,783; Filed 2019-07-12, Pending]
Co-Inventors: Clifford P. Brangwynne, Victoria Drake, **David W. Sanders**
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AWARDS / FELLOWSHIPS

- 2018-2019 **NRSA F32 Fellowship**, “Elucidating the molecular architecture and biological function of multiphase nuclear speckles”, Princeton University
- 2016 David M. Kipnis Award for Outstanding New Insights into Disease, Washington University
- 2016 O’Leary Prize Finalist for Outstanding Contributions to Neuroscience, Washington University
- 2013- 2015 **NRSA F31 Fellowship**, “Generation of tau prion strains in dividing mammalian cells”, WashU
- 2014 First-author manuscript featured in *Neuron* “Best of 2014” issue (*Cell Press*)
- 2014 Best Poster, Hope Center for Neurological Disease Retreat, Washington University
- 2010-2013 Miller Scholarship for Outstanding Potential in Translational Research, Washington University
- 2009 Summer Undergraduate Research Fellowship, University of Nebraska Medical Center
- 2009 Graduation with Honors in both Neurobiology and Psychology, University of Kansas
- 2005-2009 National Merit Scholarship, University of Kansas
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INVITED TALKS

22. 2024 *Seminar*: Genentech (San Francisco, CA)
21. 2024 *Seminar*: Intrinsically Disordered Proteins (Online research interest group/virtual)
20. 2023 *Seminar*: University of Toronto, Donnelly Centre/Molecular Genetics (Toronto, ON)
19. 2023 *Seminar*: UT Southwestern, Center for Alzheimer’s and Neurodegenerative Diseases (Dallas, TX)

18. 2023 *Seminar*: Columbia University, Genetics and Development (New York, NY)
 17. 2023 *Seminar*: Sanford Burnham Prebys, Center for Genetic Disorders and Aging (La Jolla, CA)
 16. 2023 *Seminar*: Stony Brook University, Biochemistry and Cell Biology (Stony Brook, NY)
 15. 2023 *Seminar*: UT Southwestern, Cell Biology (Dallas, TX)
 14. 2023 *Seminar*: University of Pennsylvania, Genetics/Bioengineering (Philadelphia, PA)
 13. 2023 *Seminar*: Johns Hopkins University, Cell Biology (Baltimore, MD)
 12. 2023 *Symposium*: Columbia University, Columbia Stem Cell Initiative (New York, NY)
 11. 2023 *Symposium*: Rockefeller University (New York, NY)
 10. 2023 *Symposium*: Yale University, Molecular Cellular and Developmental Biology (New Haven, CT)
 9. 2022 *Seminar*: University of Pennsylvania, Physiology (Philadelphia, PA)
 8. 2022 *Seminar*: Stowers Institute for Medical Research (Kansas City, MO)
 7. 2022 *Seminar*: University of Chicago, Molecular Genetics and Cell Biology (Chicago, IL)
 6. 2022 *Workshop*: Phase Separation in Biology and Disease (Telluride, CO)
 5. 2020 *Seminar*: UT Southwestern, Center for Alzheimer's and Neurodegenerative Diseases (Dallas, TX)
 4. 2020 *Workshop*: Phase Separation in Biology and Disease (Telluride, CO)
 3. 2014 *Conference*: Prion (Trieste, IT)
 2. 2013 *Retreat*: Washington University, Hope Center for Neurodegenerative Diseases (St. Louis, MO)
 1. 2012 *Conference*: Neurodegenerative Diseases (Cold Spring Harbor, NY)
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MENTORING, TEACHING, AND PROFESSIONAL ACTIVITIES

INDEPENDENT MENTORING (Sanders Lab, UT Southwestern)

- 2024-TBD Vaibhav Bommareddy, MSTP student
- 2024-TBD Rupam Ghosh, Postdoctoral fellow
- 2024-TBD Grigorii Sultanakhmetov, Postdoctoral fellow
- 2024-TBD Yasmeen Khan, Postdoctoral fellow
- 2024-TBD Shefali Banerjee, Senior scientist
- 2024-TBD Harper Averitt, Undergraduate researcher
- 2024-TBD Srivinya Karusala, High school researcher
- 2024-TBD Lance Hewes, High school researcher
- 2023-TBD Michael Jimenez, Research technician

POSTDOCTORAL CO-MENTORING (with Cliff Brangwynne)

- 2022-2023 Hailey Tanner, Graduate student (Current: Graduate student, Princeton)
- 2021-2023 Jordy Botello, Graduate student (Current: Graduate student, Princeton)
- 2021-2023 Lenny Wiesner, Graduate student (Current: Graduate student, Princeton)
- 2019-2021 Chang Choi, Graduate student (Current: Graduate student, Princeton)
- 2019-2020 Allana Iwanicki, Undergraduate (Current: Graduate student, Johns Hopkins)
- 2018-2019 Rivkah Brown, Graduate student (Current: Graduate student, Princeton)
- 2017-2018 Victoria Drake, Master's student (Current: Associate scientist III, Alexion Pharma)
- 2017-2018 Anastasia Repouliou, Undergraduate (Current: Graduate student, Harvard)
- 2016-2017 Garrett Baird, Undergraduate (Current: Senior specialist, Merck)

DOCTORAL CO-MENTORING (with Marc Diamond)

- 2014-2016 Jaime Vaquer-Alicea, Graduate student (Current: Research Asst Professor, UT Southwestern)
- 2014-2016 Victor Mañon, Undergraduate research scientist (Current: M.D./Ph.D. student, Weill Cornell Med)
- 2013-2016 Apurwa Sharma, Graduate student (Current: Senior scientist, Paros Bio)

TEACHING

- 2024- Small group discussion leader, Responsible Conduct of Research, UT Southwestern
- 2024- Graduate school qualifying examination committee member, UT Southwestern
- 2011 Teaching assistant, Neuroscience for Physical Therapists, Washington University
- 2009-2010 Unpaid private tutor, Intro to Neurobiology/Advanced Neurobiology, University of Kansas

PROFESSIONAL ACTIVITIES

- 2024- Lab affiliate, UT Southwestern Condensate Club
- 2023- Faculty member, Hamon Center for Regenerative Science and Medicine (CRSM), UT Southwestern
- 2023- Faculty member, Cell and Molecular Biology Graduate Program, UT Southwestern
- 2023- Faculty member, Genetics, Development, and Disease Graduate Program, UT Southwestern
- 2021-2023 Paid consultant, Nereid Therapeutics
- 2018-2023 Member, Princeton University discussion group on phase separation ("Phase Group")
- 2017-2019 Co-founder, Phase Separation Journal Club (online pre-print review group)
- 2016- Ad-hoc article commenter, Alzforum.org
- 2014- Ad-hoc peer reviewer, *Nature*, *Science*, *Cell*, *Molecular Cell*, *Neuron*, *Cell Reports*, *EMBOJ*, *Nature Communications*, *Journal of Biological Chemistry*, *Journal of Cell Biology*, *Journal of Neuroscience*, *Molecular Neurodegeneration*, *Chemical Reviews*, *PNAS*, *Nature Materials*, *Molecular Bio of the Cell*