

Sarah H. Shahmoradian, Ph.D.

Assistant Professor

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Education:

2013 **Ph.D.**, Molecular Physiology and Biophysics
Baylor College of Medicine, Houston, TX
Advisor: Wah Chiu

2006 **B.Sc.**, Biology
James Madison University, Harrisonburg, VA
Advisor: Mark Gabriele

Professional Experience:

- 09/2021 onward **Assistant Professor**
University of Texas Southwestern Medical Center, Center for Alzheimer's and Neurodegenerative Diseases at the Peter J. O'Donnell Jr. Brain Institute, Department of Biophysics
- 2020 – 2021 **Senior Scientist**
Biozentrum of the University of Basel, Center for Cellular Imaging and NanoAnalytics, Department of Biosystems Science and Engineering
- 2016 – 2019 **Principal Investigator**
Paul Scherrer Institute of the Swiss Federal Institute of Technology (ETH Zürich), Department of Biology and Chemistry, Laboratory of Nanoscale Biology
- 2013 – 2016 **Postdoctoral Fellow**
Roche Innovation Center Basel and University of Basel, Departments of Neurosciences, Ophthalmology and Rare Diseases – Discovery and Translation Areas, Chemical Biology, Structural Biology and Biophysics
Advisors: Dr. Henning Stahlberg (Uni. Basel), Dr. Markus Britschgi and Dr. Matthias Lauer (Roche)
- 2007 – 2013 **Research Assistant**
Baylor College of Medicine, National Center for Macromolecular Imaging, Department of Biochemistry
Advisor: Dr. Wah Chiu
- 2009 – 2012* **Visiting Researcher**

Stanford University and University of California at San Diego,
Department of Neuroscience
Advisor: Dr. William Mobley
*Periodic visits interspersed over 3 years for collaborative work

- Summer 2005 **Research Intern**
Summer Medical and Research Training (S.M.A.R.T.) Program,
Baylor College of Medicine, Department of Physiology and
Biophysics
Advisor: Dr. Robia Pautler
- 2003 – 2006 **Research Assistant**
James Madison University, Department of Biology,
Neuroanatomy Lab
Advisor: Dr. Mark Gabriele
- Summer 2004 **Research Intern**
School of Medicine, Virginia Commonwealth University,
Department of Anatomy and Neurobiology
Advisor: Dr. Kimberle Jacobs

Selected Meetings and Presentations:

- 2022 **Invited speaker**, National Science Foundation “Physical Mechanisms in Neurodegenerative Disease Workshop,” Washington, DC Metro Area
- 2022 **Invited speaker**, Alliance of Women Scientists, UT Southwestern Medical Center, Dallas, Texas
- 2021 **Invited speaker**, Stanford-SLAC Cryo-EM Center (S2C2), Stanford University, Palo Alto, California
- 2019 **Invited speaker**, 89th IUVSTA International Union for Vacuum Science, Technique, and Applications Conference: Biological and soft matter sample preparation for high resolution imaging by high vacuum techniques, Zakopane, Poland
- 2019 **Invited speaker**, AD/PD 2019, the 14th International Conference on Alzheimer's and Parkinson's Diseases and related neurological disorders, Lisbon, Portugal
- 2018 **Invited speaker**, Diamond-II Workshop: Bio-Cryo Imaging & Microscopy, Oxfordshire, United Kingdom
- 2018 **Invited speaker**, SYNUCLEIN 2018: Demystifying Alpha-Synuclein Functions in Health and Disease, Lausanne, Switzerland
- 2018 **Poster**, Biointerfaces International Conference, Zurich, Switzerland
- 2017 **Invited speaker**, NanoSymposium at the Institute for Regenerative Medicine, University of Zurich, Switzerland
- 2016 **Invited lecturer**, Stereology and Morphometry in Neurosciences Course, VU Medical Center, Amsterdam, The Netherlands
- 2016 **Invited speaker**, Biozentrum Annual Symposium, Basel, Switzerland
- 2015 **Invited speaker**, Roche International RPF Symposium: Multi-Disciplinary Brain Research and Neuroscience to Explore Neuropathological Diseases, Copenhagen, Denmark
- 2015 **Instructor**, Block Course Structural Biology and Biophysics (VV15920), University of Basel, Biozentrum, Switzerland

- 2014 **Invited speaker**, Roche Neuroscience Research Forum (NRF), Basel, Switzerland
- 2014 **Invited speaker**, Roche International RPF Symposium, Munich, Germany
- 2012 **Poster**, Center for NeuroEngineering Annual Symposium, Houston, TX
- 2011 **Poster**, Society for Neuroscience (SfN) Conference, Washington, DC
- 2011 **Poster**, Molecular Mechanisms of Neurodegeneration, 5th International Meeting, Milan, Italy
- 2011 **Invited spotlight speaker and poster**, 6th International Congress on Electron Tomography, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany
- 2010 **Invited spotlight speaker and poster**, Hereditary Disease Foundation Meeting: Milton Wexler Celebration of Life, Cambridge, Massachusetts
- 2010 **Poster**, National Institute of Health (NIH) National Institute of Biomedical Imaging and Bioengineering: Training Grantees Meeting, Bethesda, Maryland
- 2010 **Poster**, National Institute of Health (NIH) Nanomedicine Development Centers, 4th Annual Awardee Meeting, Asilomar, California
- 2006 **Posters (2)**, International Society for Magnetic Resonance in Medicine (ISMRM) 14th Scientific Meeting and Exhibition, Seattle, Washington
- 2005 **Poster**, Society for Neuroscience (SfN) Conference, Washington, DC

Awarded Grants, Fellowships and Honors:

- 2022 Stanley Fahn Junior Faculty Award, Parkinson's Foundation
- 2022 Distinguished Researcher Award, President's Research Council (PRC)
- 2021 HHMI Large Equipment Funding (**Collaborative PI**)
- 2017 Horizon 2020 Marie Skłodowska-Curie COFUND Grant Funding: PSI-FELLOW-II-3i Grant Funding for a Postdoctoral Fellow (**Primary lead PI**)
- 2016 Competence Centre for Materials Science and Technology (CCMX) Analytical Platform Grant (**Primary lead PI**)
- 2016 Paul Scherrer Institute CROSS Initiative Funding (**Primary lead PI**)
- 2013 Roche Postdoctoral Fellowship
- 2011 European Molecular Biology Laboratory (EMBL) Advanced Training Centre Corporate Partnership Programme Fellowship
- 2010 NIH NIBIB Nanobiology Interdisciplinary Graduate Training Fellowship
- 2006 Margaret A. Gordon Memorial Scholarship, Excellence in Undergraduate Biological Research
- 2002 Altria Group, Inc. Leadership Scholarship
- 2002 Dow Jones and Richmond Times-Dispatch Entrepreneur Award and Scholarship
- 2002 Gold Key Award for Investigative Journalism, Quill and Scroll International Journalism Honor Society

Mentoring and Leadership Experience:

- 09/2021 – Present Mentoring postdoctoral scientists (UTSW Medical Center)
- 03/2016 – 05/2021 Mentored graduate student doctoral thesis (ETH Zürich)
- 03/2020 – 02/2021 Project Management as a Senior Scientist: Swiss National Science Foundation SINERGIA project "Molecular & Cellular

03/2016 – 02/2019	Modulation in Parkinson's Disease" between 3 multi-disciplinary labs (specialties: cryo-EM, NMR, LiP-MS) Project Management as a Principal Investigator: Multi-scale human brain imaging (cryo-electron microscopy, cryo X-ray tomography, fluor. microscopy) and technology development
03/2017 – 02/2019	Mentored Marie-Curie Postdoctoral Fellow
04/2015 – 07/2019	Mentored graduate student doctoral thesis (Biozentrum, University of Basel)
02/2011 – 09/2012	Mentored rotation students

Publications:

1. Tran HT, Lucas MS, Ishikawa T, **Shahmoradian SH***, Padeste C* (co-senior authors, equal contribution). A Compartmentalized Neuronal Cell-Culture Platform Compatible With Cryo-Fixation by High-Pressure Freezing for Ultrastructural Imaging. *Frontiers in Neuroscience*. 2021 Sep 8.
2. Galaz-Montoya JG, **Shahmoradian SH**, Shen S, Frydman J, Chiu W. Cryo-electron tomography provides topological insights into mutant huntingtin exon 1 and polyQ aggregates. *Nature Communications Biology*. 2021 Jul 8.
3. Miettinen A, Zippo AG, Patera A, Bonnin A, **Shahmoradian SH**, Biella GEM, Stampanoni M. Micrometer-resolution reconstruction and analysis of whole mouse brain vasculature by synchrotron-based phase-contrast tomographic microscopy. *bioRxiv*. 2021 Mar 16.
4. Tran HT, Tsai EHR, Lewis AJ, Moors T, Bol JGJM, Rostami I, Diaz A, Jonker AJ, Guizar-Sicairos M, Raabe J, Stahlberg H, van de Berg WDJ, Holler M, **Shahmoradian SH**. Alterations in sub-axonal architecture between normal aging and Parkinson's diseased human brains using label-free cryogenic X-ray nanotomography. *Frontiers in Neuroscience*. 2020 Nov 25.
5. Holler M, Ihli J, Tsai EHR, Nudelmann F, Verezhak M, van de Berg WDJ, **Shahmoradian SH**. A lathe system for micrometer-sized cylindrical sample preparation at room and cryogenic temperatures. *Journal of Synchrotron Radiation*. 2020 Mar 1.
6. Rostami I, Rezvani AH, Hu Z, **Shahmoradian SH**. Breakthroughs in medicine and bioimaging with upconversion nanoparticles. *International Journal of Nanomedicine*. 2019 Sep 23.
7. Lewis AJ, Genoud C, Pont M, van de Berg WDJ, Frank S, Stahlberg H, **Shahmoradian SH**, Al-Amoudi A. Imaging of post-mortem human brain tissue using electron and X-ray microscopy. *Current Opinion in Structural Biology*. 2019 Oct 1.
8. **Shahmoradian SH**, Lewis AJ, Genoud C, Hench J, Moors T, Navarro PP, Castano-Diez D, Schweighauser G, Graff-Meyer A, Goldie KN, Suetterlin R, Huisman E, Ingrassia A, de Gier Y, Rozemuller AJM, El-Mashtoly SF, Quadri M, van IJcken WFJ, Bonifati V, Gerwert K, Bohrmann B, Frank S, Britschgi M, Stahlberg H, van de Berg WDJ, Lauer ME. Lewy pathology in Parkinson's disease consists of a crowded organellar membranous medley. *Nature Neuroscience*. 2019 Jun 24.
9. Navarro PP, Genoud C, Castaño-Díez D, Graff-Meyer A, de Gier Y, Lauer ME, Britschgi M, Bohrmann B, Frank S, Hench J, Schweighauser G, Rozemuller AJM, van de Berg WDJ, Stahlberg H, **Shahmoradian SH**. Cerebral Corpora

- amylacea are dense membranous labyrinths containing structurally preserved cell organelles. *Scientific Reports*. 2018 Dec 21.
10. Holler M, Raabe J, Wepf R, **Shahmoradian SH**, Diaz A, Sarafimov B, Lachat T, Walther H, Vitins M. OMNY PIN: A versatile sample holder for tomographic measurements at room and cryogenic temperatures. *Review of Scientific Instruments*. 2017 Nov 20.
 11. **Shahmoradian SH**, Tsai EHR, Diaz A, Guizar-Sicairos M, Raabe J, Spycher L, Britschgi M, Ruf A, Stahlberg H, Holler M. Three-Dimensional Imaging of Biological Tissue by Cryo X-Ray Ptychography. *Scientific Reports*. 2017 Jul 24.
 12. Shen K, Calamini B, Fauerbach J, Ma B, **Shahmoradian SH**, Serrano Lachapel I, Chiu W, Lo D, Frydman J. Control of the structural landscape and neuronal proteotoxicity of mutant Huntingtin by domains flanking the polyQ tract. *eLife*. 2016 Oct 18.
 13. Zhao X, Chen X, Han E, Hu Y, Paik P, Ding Z, Overman J, Lau AL, **Shahmoradian SH**, Chiu W, Thompson LM, Wu C, Mobley WC. TRiC subunits enhance BDNF axonal transport and rescue striatal atrophy in Huntington's disease. *Proceedings of the National Academy of Sciences*. 2016 Sep 20.
 14. **Shahmoradian SH**, Galiano MR, Wu C, Chen S, Rasband MN, Mobley WC, Chiu W. Preparation of Primary Neurons for Visualizing Neurites in a Frozen-hydrated State Using Cryo-Electron Tomography. *Journal of Visualized Experiments*. 2014 Feb 12.
 15. **Shahmoradian SH**, Galaz-Montoya J, Schmid M, Cong Y, Ma B, Spiess C, Frydman J, Ludtke S, Chiu W. TRiC's tricks inhibit huntingtin aggregation. *eLife*. 2013 Jul 9.
 16. Fauerbach JA, Yushchenko DA, **Shahmoradian SH**, Chiu W, Jovin TM, Jares-Erijman EA. Supramolecular Non-Amyloid Intermediates in the Early Stages of aSyn-Synuclein Aggregation. *Biophysical Journal*. 2012 Mar 7.
 17. Gabriele ML, **Shahmoradian SH**, French CC, Henkel CK, McHaffie JG. Early segregation of layered projections from the lateral superior olivary nucleus to the central nucleus of the inferior colliculus in the neonatal cat. *Brain Research*. 2007 Aug 8.