

Utkur M. Mirsaidov



Assistant Professor
Dept. of Physics / Biological Sciences / Materials Science,
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Personal:

DOB: January 20, 1980

Education:

Ph.D. Physics, The University of Texas-Austin, USA. (December, 2005)
B.S. Physics, The University of Texas-Austin, USA. (May, 2000)

Employment:

2013-Present:

Assistant Professor,
Department of Physics, National University of Singapore.
Department of Biological Sciences, National University of Singapore.
Department of Materials Sciences, National University of Singapore.
Centre for Advanced 2D Materials, National University of Singapore.
Center for BioImaging Sciences, National University of Singapore.
NUS Nanoscience and Nanotechnology Institute.

2009-2013:

Research Fellow
MechanoBiology Institute, NUS.

2006-2008:

Postdoctoral Research Fellow
Department of Electrical Engineering & Beckman Institute for Advanced Science and Technology. University of Illinois at Urbana-Champaign.

Awards:

The Nanotechnology Physics Award, Institute of Physics-Singapore, 2016
NUS Young Scientist Award, 2016
NUS Young Investigator Award, 2014

Research Interest:

Nanoscience (Self-Assembly, Materials synthesis), Development of advanced electron microscopy techniques (*in situ* TEM, characterization, data processing), Physics and chemistry at interfaces, Nanofabrication, Soft matter and nanoscale biology.

Patents:

1. Patent Title: "Detecting and *Sorting of Methylated DNA Using a Synthetic Nanopore.*"
US2012/0040343, US8394584, WO2010080617A2, WO2010080617A3. (*Licensed to Oxford Nanopore Technologies.*)
2. Patent Title: "Characterizing Stretched Polynucleotides in a Synthetic Nano-passage."
US2011/0226623, US8748091. (*Licensed to Oxford Nanopore Technologies.*)

Research Grants:

Lead Principal Investigator:

1. Singapore Ministry of Education Academic Research Fund Tier 2 (S\$831,234; 1/02/2019-31/01/2022).- awarded
2. Singapore Ministry of Education Academic Research Fund Tier 2 (S\$753,384; 31/07/2017-1/02/2020).- ongoing
3. Singapore Ministry of Education Academic Research Fund Tier 2 (S\$681,600; 2/02/2016-1/02/2019).- ongoing
4. ThermoFisher Scientific, Inc., Discovery Innovation Grant (S\$123,264; 1/09/2015-31/08/2016).- completed
5. NUS Young Investigator Award-2014 (S\$500,000; 15/02/2015-15/02/2019).- ongoing

Co-Principle Investigator:

1. Singapore National Research Foundation Competitive Research Grant-16 (1/11/2016-30/10/2020).- ongoing
2. Singapore National Research Foundation Competitive Research Grant-13 (1/06/2015-31/05/2020).- ongoing
3. Singapore National Research Foundation Competitive Research Grant-9 (1/03/2013-31/08/2016).- completed

Publications:

1. S. F. Tan, G. Bisht, U. Anand, M. Bosman, X. E. Yong, U. Mirsaidov, "In situ Kinetic and Thermodynamic Growth Control of Au-Pd Core-Shell Nanoparticles." **J Am. Chem Soc** 140 (37), 11680-11685 (2018).
2. X. Tian, U. Anand, U. Mirsaidov, H. Zheng, "Spontaneous reshaping and splitting of AgCl nanocrystals under electron beam illumination." **Small** (2018) (DOI: 10.1002/sml.201803231).
3. S. F. Tan, S. Raj, G. Bisht, H. Annadata, C. Nijhuis, P. Kral, U. Mirsaidov, "Nanoparticle Interactions Guided by Shape-Dependent Hydrophobic Forces." **Advanced Materials** 30 (16), 1707077 (2018)
4. S. W. Chee, S. F. Tan, Z. Baraissov, M. Bosman, U. Mirsaidov, "Direct Observation of the Nanoscale Kirkendall Effect During Galvanic Replacement Reactions" **Nature Communications** 8, 1224 (2017).
5. E. Miele, S. Raj, Zh. Baraissov, P. Kral, U. Mirsaidov, "Dynamics of Templated Assembly of Nanoparticle Filaments within Nanochannels." **Advanced Materials** 29 (37), 1702682 (2017).
6. D. Loh, S. Soumyo, M. Bosman, S.-F. Tan, C. A. Nijhuis, P. Král, P. Matsudaira, U. Mirsaidov, "Multi-step Nucleation of Nanocrystals." **Nature Chemistry** 9, 77-82 (2017).
7. S.F. Tan, S.W. Chee, G. Lin, U. Mirsaidov, "Direct Observation of Interactions between Nanoparticles and Nanoparticle Self-Assembly in Solution." **Acc. Chem. Res.** 50(6), 1303-13012 (2017).
8. Z. Aabdin, X. M. Xu, S. Sen, U. Anand, P. Kral, F. Holsteyns, U. Mirsaidov, "Transient Clustering of Reaction Intermediates During Wet Etching of Silicon Nanostructures." **Nano Lett.** 17 (5), 2953-2958 (2017).

9. S. F. Tan, U. Anand, and U. Mirsaidov, "Interactions and Attachment Pathways between Functionalized Gold Nanorods." **ACS Nano** 11 (2), 1633-1640 (2017).
10. X. Tian, H. Zheng, U. Mirsaidov, "Aggregation Dynamics of Nanoparticles at Solid-Liquid Interface." **Nanoscale** 9, 10044-10050 (2017).
11. S. W. Chee, Z. Baraissov, N. D. Loh P. Matsudaira, and U. Mirsaidov, "Desorption-Mediated Motion of Nanoparticles at the Liquid-Solid Interface." **J. Phys Chem. C** 120 (36), 20462–20470 (2016).
12. G. Lin, S.W. Chee, S. Raj, P. Král, U. Mirsaidov, "Linker-Mediated Self-Assembly of Charged Nanoparticles." **ACS Nano** 10(8), 7443-7450 (2016).
13. S.F. Tan, G. Lin, G. Lin, M. Bosman, U. Mirsaidov, and C. A. Nijhuis, "Real-Time Dynamics of Galvanic Replacement Reactions of Silver Nanocubes and Au Studied by Liquid-Cell Transmission Electron Microscopy." **ACS Nano** 10(8), 7689-7695 (2016).
14. S.-F. Tan, S. W. Chee, G. Lin, M. Bosman, M. Lin, U. Mirsaidov, C. A. Nijhuis, "Real-Time Imaging of the Formation of Au-Ag Core-Shell Nanoparticles." **J. Am. Chem. Soc.** 138(16), 5190-5193 (2016).
15. C. O'Regan, X. Zhu, Z. Jun, U. Anand, H. Su, U. Mirsaidov, "CTAB-Influenced Electrochemical Dissolution of Silver Dendrites." **Langmuir** 32(15), 3601-3607 (2016).
16. U. Anand, J. Lu, D. Loh, Z. Aabdin, U. Mirsaidov, "Hydration Layer-mediated Pairwise Interaction of Nanoparticles." **Nano Lett.** 16(1), 786–790 (2016).
17. G. Lin, X. Zhu. U. Anand, Q. Liu, J. Lu, H. Su, U. Mirsaidov, "Nanodroplet-Mediated Assembly of Platinum Nanoparticle Rings in Solution." **Nano Lett.** 16(2), 1092–1096 (2016).
18. Q. Liu, F. Y. Leong, Z. Aabdin, U. Anand, T. S. B. Quang, U. Mirsaidov, "Nanodroplet depining from nanoparticles." **ACS Nano** 9(9), 9020–9026 (2015).
19. T. S. B. Quang, F. Y. Leong, U. Mirsaidov, "Numerical study of homogeneous nanodroplet growth." **J. Colloid Interface Sci.** 438, 47-54 (2015).
20. Z. Aabdin, J. Lu, X. Zhu, U. Anand, N. Loh, H. Su, U. Mirsaidov, "Bonding pathways of gold nanocrystals in solution" **Nano Lett.** 14(11), 6639-6643 (2014).
21. J. Lu, Z. Aabdin, D. Loh, D. Bhattacharya, U. Mirsaidov, "Nanoparticle dynamics in a nanodroplet" **Nano Lett.** 14(4), 2111-2115 (2014).
22. D. Bhattacharya, M. Bosman, F.-Y. Leong, U. Mirsaidov, "Nucleation of water nanodroplet." **Microsc. Microanal.** 20, 407-415 (2014).

Before 2014:

23. F.-Y. Leong, U. Mirsaidov, P. Matsudaira, L. Mahadevan, "Dynamics of a nanodroplet under a transmission electron microscope." **Phys. Fluids** 26, 012003 (2014).

24. T-W. Huang, S-H. Liu, Y-J. Chuang, H-Y. Hsieh, C-Y. Tsai, W-J. Wu, C-T. Tsai, U. Mirsaidov, P. Matsudaira, C-S. Chang, F-G. Tseng, F-R. Chen, "Dynamics of Hydrogen Nanobubbles in KLH Protein Solution Studied with In-Situ Wet-TEM." **Soft Matter** 9, 8856-8861 (2013).
25. U. Mirsaidov, V.R.S.S. Mokkalapati, D. Battacharya, H. Andersen, M. Bosman, B. Ozyilmaz, P. Matsudaira, "Scrolling graphene into Nanofluidic channels." **Lab Chip** 13, 2874-2878 (2013).
26. H. Zheng, U. Mirsaidov, L.-W. Wang, P. Matsudaira, "Electron beam manipulation of nanoparticles." **Nano Lett.** 12, 5644-5648 (2012).
 - Featured in Chemical & Engineering News, Nanowerk, LBNL News and ExteremeTech.
27. U. Mirsaidov, H. Zheng, D. Bhattacharya, Y. Casana, P. Matsudaira, "Direct observation of the stick-slip movement of nanometer-size water droplets induced by electron beam." **Proc. Natl. Acad. Sci. U.S.A.** 109(19), 7187-7190 (2012).
28. U. Mirsaidov, C. D. Ohl, P. Matsudaira, "A direct observation of nanovoid formation in ultrathin water film." **Soft Matter** 8(27), 3108-3111 (2012).
29. U. Mirsaidov, H. Zheng, Y. Casana, P. Matsudaira, "Imaging protein structure in water at 2.7 nm resolution by TEM." **Biophys. J.** 102, L15-L17 (2012).
 - Selected by **Faculty of 1000**.
 - Top 5 most downloaded article in Biophysical Journal in Feb 2012.
 - Selected as Best of 2012 Articles by Biophysical Journal.
30. T-W. Huang, S-H. Liu, Y-J. Chuang, H-Y. Hsieh, C-Y. Tsai, Y-T Huang, U. Mirsaidov, P. Matsudaira, F-G. Tseng, C-S. Chang, F-R. Chen, "Self-Aligned Wet-Cell for Hydrated Microbiology Observation in TEM." **Lab Chip** 12, 340-347 (2012).
31. G. Timp, U. Mirsaidov, et al., "3rd Generation DNA Sequencing with a Nanopore." chapter in *Nanopores: Sensing and Fundamental Biological Interactions*. Eds. Rashid Bashir and Samir M. Iqbal. (Springer: ISBN: 978-1-4419-8251-3). (2011)
32. U. Mirsaidov, S. Timashev, Y. Polyakov, P. Misurkin, I. Musaev, S. Polyakov, "Analytical Method for parameterizing the random profile components of nanosurfaces imaged by atomic force microscopy" **Analyst** 136, 570-576 (2011).
33. U. Mirsaidov, V. Dimitrov, J. Commer, D. Wang, A. Aksementiev, G. Timp. "Slowing the translocation of double stranded DNA using a nanopore smaller than the double helix." **Nanotechnology** 21, 395501 (2010).
34. W. Timp, U. Mirsaidov, D. Wang, J. Comer, O. Aksementiev, "Nanopore Sequencing: Electrical Measurements of the Code of Life" **IEEE Trans Nanotechnol** 9, 281-294 (2010).
 - Selected for the cover of the journal.
35. U. Mirsaidov, D. Wang, W. Timp, G. Timp, "Molecular Diagnostics for Personal Medicine using a Nanopore." **Nanomed Nanobiotecnol.** 2, 367-381 (2010).
36. V. Dimitrov, U. Mirsaidov, D. Wang, T. Sorsch, W. Mansfield, J. Miner, F. Klemens, S. Yemenicioglu, G. Timp "Solid-State Nanopores in solid-state membranes engineered for Single Molecule Detection." **Nanotechnology** 21, 065502 (2010).
 - Featured in the **Technology Update** of [Nanotechweb](#) of Institute of Physics:

“Run silent, deep submicron, and fast”

37. B. Dorvel, G. Sigalov, Q. Zhao, J. Comer, V. Dimitrov, U. Mirsaidov, A. Aksementiev, G. Timp, “Analyzing the Forces Binding a Restriction Endonuclease to DNA Using a Synthetic Nanopore.” ***Nucleic Acids Res.*** 37(12) 4170-4179 (2009).
38. U. Mirsaidov, W. Timp, V. Dimitrov, X. Zou, K. Schulten, A. Feinberg, G. Timp, “Nanoelectromechanics of Methylated DNA in a Synthetic Nanopore.” ***Biophys. J.*** 96(4), L32-L34 (2009).
39. W. Timp, U. Mirsaidov, P. Matsudaira, G. Timp, “Jamming prokaryotic cell-to-cell communication in a model biofilm.” ***Lab Chip*** 9, 925-934 (2009).
40. U. Mirsaidov, J. Scrimgeour, W. Timp, M. Mir, P. Matsudaira, G. Timp, “Live Cell Lithography: Using optical tweezers to create synthetic tissue.” ***Lab Chip*** 8, 2174-2181 (2008).
- Featured in the **Research News** of *Chemical Biology* 3(11), p. B83 (2008). “Tiling yields model tissue.”
 - Selected as a *Royal Society of Chemistry’s* Hot Article of 2008.
41. U. Mirsaidov, W. Timp, K. Timp, M. Mir, P. Matsudaira, G. Timp, “Optimal Optical Trap for Bacterial Viability.” ***Phys. Rev. E*** 78, 021910 (2008).
- Selected for *Virtual Journal of Biological Physics Research* 16(5) (2008)
42. Q. Zhao, G. Sigalov, V. Dimitrov, B. Dorvel, U. Mirsaidov, S. Sligar, A. Aksimentiev, G. Timp, “Detecting SNPs Using a Synthetic Nanopore.” ***Nano Lett.*** 7, 1680-1685 (2007).
43. G. Akselrod, W. Timp, U. Mirsaidov, Q. Zhao, R. Timp, K. Timp, P. Matsudaira, G. Timp. “Laser-Guided Assembly of Heterotypic 3D Living Cell Microarrays.” ***Biophys. J.*** 91, 3465-3473 (2006).
- Selected for the cover of the journal.
44. J. Sessler, E. Tomat, M. Tarak, V. Lynch, J. Veauthier, U. Mirsaidov, J. Markert. “A Schiff Base Expanded Porphyrin Macrocyclic that Acts as a Versatile Binucleating Ligand for Late First-Row Transition Metals.” ***Inorg Chem.*** 44, 2125-2127 (2005).
45. J. M. Veauthier, E. Tomat, V. M. Lynch, J. L. Sessler, U. Mirsaidov and J. Markert, “Calix[4]pyrrole Schiff Base Macrocyclics: Novel Binucleating Ligands for Cu(I) and Cu(II).” ***Inorg Chem.*** 44, 6736-6743 (2005).
46. M. Pan, H. Liu, J. Wang, J. Jia, Q. Xue, J. Li, S. Qin, U. Mirsaidov, X. Wang, Zh. Zhang, J. Markert, and C. K. Shih. “Quantum growth of magnetic nanoplatelets of Co on Si with high blocking temperature.” ***Nano Lett.*** 5, 87-90 (2005).
47. J. Choi, U. Mirsaidov, C. Miller, Y. Lee, S. Guchhait, M. Chabot, W. Lu, and J. Markert. “Oscillator Microfabrication, Micromagnets, and Magnetic Resonance Force Microscopy.” ***Proc. SPIE: MEMS, BioMEMS, and Nanotechnology*** 5389, p.399 (2004).
48. C. Miller, U. Mirsaidov, T. Messina, Y. Lee, and J. Markert, “External Field effects on the resonant frequency of magnetically capped oscillators for magnetic resonance force microscopy.” ***J. Appl. Phys.*** 93, 6572-6574 (2003).