

MURAT BARISIK, PhD

Associate Professor
Mechanical Engineering
Izmir Institute of Technology
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EDUCATION

- Ph.D.** Old Dominion University, Norfolk, VA, USA, May, 2012,
Major: Mechanical and Aerospace Engineering,
Dissertation: Molecular Dynamics Studies on Nanoscale Gas Transport
Received "Faculty Award in Aerospace Engineering, 2012"
Advisor: Prof. Dr. Ali Beskok
- M.S.** Middle East Technical University, Ankara, Turkey, June, 2008,
Major: Mechanical Engineering,
Dissertation: Analytical Solution for Single Phase Microtube Heat Transfer including Axial Conduction and Viscous Dissipation
Advisor: Assoc. Prof. Dr. Almila Guvenc Yazicioglu
Co-Advisor: Prof. Dr. Sadik Kakac
- B.S.** Middle East Technical University, Ankara, Turkey, June, 2006,
Major: Mechanical Engineering,

EXPERIENCE

- Associate Professor:** Izmir Institute of Technology, Mechanical Engineering (*11/18 to present*).
- Local Steering Committee:** ICTP-ECAR (ICTP – Eurasian Centre for Advanced Research) (*8/18 to present*).
- Assistant Professor:** Izmir Institute of Technology, Mechanical Engineering (*8/14 to 11/18*).
- Research Assistant Professor:** Southern Methodist University, Mechanical Engineering (*8/13 to 8/14*).
- Research Scientist:** Old Dominion University, Institute of Micro and Nanotechnology (*8/12 to 8/13*).
- Postdoctoral Researcher:** Old Dominion University, Institute of Micro and Nanotechnology (*5/12 to 8/12*).
- Research Assistant:** Old Dominion University, Mechanical & Aerospace Engineering (*8/08 to 5/12*).
- Teaching Assistant:** Middle East Technical University, Mechanical Engineering (*8/06 to 8/08*).
- Student Assistant:** Middle East Technical University, Mechanical Engineering (*9/04 to 5/06*).

TEACHING

Primary Interests

- Core areas of the Thermo-fluids, including specialist elective courses on:
 - Micro/Nano flows, Microfluidics,
 - Micro/Nano Heat Transport,
 - Electrokinetic Phenomena

Graduate Students

- *Fetiye Esin Yakin*, MS in IZTECH, "Effect of Nano-scale Patterns on Transport", (*05/18 to present*).
- *Onur Yenigun*, PhD in IZTECH, "Nanoscale Heat Transfer", (*09/17 to present*).
- *Oyku Alan*, MS in IZTECH, "Electrokinetics of Mesoporous Silica Nanoparticles", (*07/17 to present*).
- *Gokberk Ozcelik*, MS in IZTECH, "Micro/nano-scale Surface Wetting", (*09/16 to present*).
- *Tumcan Sen*, PhD in IZTECH, "Electro-viscosity Effects in Nano-liquid Transport", (*01/16 to present*).
- *Safa Sabet*, PhD in IZTECH, "Micro-scale gas transport in porous media", (*08/15 to present*).

Completed Thesis

- *MS Thesis "Investigation of Liquid Transport in Micro And Nanoscale Porous Media At Different Pore To Throat Size Ratios"* in IZTECH, Gulce Kalyoncu, (08/17).
- *MS Thesis "A study on COP improvement of a household refrigerator by using an adsorption heat pump"* in IZTECH, Gizem Arslan, (08/15).
- *MS Thesis "Numerical Determination of Permeability and Interfacial Convective Heat Transfer Coefficient for Non-Isotropic and Periodic Dual Scale Porous Medium"* in IZTECH, Safa Sabet, (08/15).

RESEARCH

Primary Interests

- Micro/Nanoscale Gas and Liquid Flows
- Micro/Nanoscale Heat Transfer
- Micro/Nanoscale Porous Transport
- Electrokinetic Flows, Microfluidics

Research Projects

1. **Principal Investigator (PI)** in “Characterization of Surface Electric Charges and Electrostatic Force Interactions of Mesoporous Silica Particles” supported by TUBITAK-1001 118M710 (11/18 to present).
2. **Principal Investigator (PI)** in “Wetting and Flow Control using Biomimicked Nano Surface Structures” supported by TUBITAK-3501 Carrier Award 117M460 (05/18 to present).
3. **Principal Investigator (PI)** in “Modeling of the Variation in Surface Charge Density by the Size of Bio-inspired Surface Structures” supported by IZTECH Grant No: 2017IYTE57 (05/18 to present).
4. **Principal Investigator (PI)** in “Modeling of the Variation in Surface Charge Density of Micro/nano-scale Channels by the Channel Height and Length” supported by IZTECH 2017IYTE49(05/18 to pres.).
5. **Principal Investigator (PI)** in “Wetting and Heat Transfer Control using Biomimicked Micro/nano Surface Structures” supported by the Outstanding Young Scientist program of the Turkish Academy of Sciences (TUBA-GEBIP-2017), (11/17 to present).
6. **Principal Investigator (PI)** in “Molecular Level Investigation of Nano-Scale Gas Flows” supported by the Marie Skłodowska-Curie COFUND under Grant No:115C026 (04/15 to 02/18).
7. **Principal Investigator (PI)** in “Theoretical Investigation of Micro/nano Liquid Flows” supported by IZTECH Grant No: 2016IYTE26 (06/16 to 12/16).
8. **Principal Investigator (PI)** in “Efficiency Increase of a Household Refrigerator by Using Adsorption Bed Type Heat Pump” supported by the Turkish Ministry of Science, Industry and Technology (SANTEZ) under Grant No: 0290.STZ.2013-2 (04/15 to 09/15).
9. **Principal Investigator (PI)** in “Molecular Modeling of Silicon/Water Interface” supported by the Extreme Science and Engineering Discovery Environment (XSEDE) under Grant No: TG-CTS130001 (10/12 to 10/13).

Book Chapters

1. **Barisik M**, Beskok A (2016) Interface Resistance and Thermal Transport in Nano-Scale Confined Liquids. *Microscale and Nanoscale Convective Heat Transfer: Concepts, Analysis, and Applications*, CRC Taylor and Francis.
2. Mobedi M, **Barisik M**, Nakayama A (2016) Characterization of Volume-averaged Transport Properties for Micro-scale Porous Media at Slip-flow Regime. *Microscale and Nanoscale Convective Heat Transfer: Concepts, Analysis, and Applications*, CRC Taylor and Francis.
3. Beskok A, **Barisik M** (2015) Molecular Dynamics Studies on Nanoscale Gas Transport. *Encyclopedia of Microfluidics and Nanofluidics*, Springer.

Journals

34. Ozcelik GH, **Barisik M** (2019) Wetting Behavior of Different Single Crystalline and Amorph Silicon Surfaces: Effective Range of Intermolecular Forces Defining Wetting. *Microfluidics Nanofluidics*, *under review*.
33. Yenigün O, **Barisik M** (2019) Electric Field Controlled Heat Transfer through Silicon and Nano-confined Water. *Nanoscale*, *under review*.
32. Ozcelik GH, **Barisik M** (2019) Surface Charge of Nano-patterned Silica Surfaces. *Physical Chemistry Chemical Physics*, *under review*.
31. Sen T, **Barisik M** (2019) Pore connectivity effects on the internal surface electric charge of mesoporous silica, *Microporous and Mesoporous Materials*, *under review*.
30. Sabet S, **Barisik M**, Mobedi M, Beskok A (2019) An Extended Kozeny-Carman-Klinkenberg Model for Gas Permeability in Micro/Nano-Porous Media. *Journal of Fluid Mechanics*, *under review*.
29. Yenigün O, **Barisik M** (2019) Effect of nano-film thickness on thermal resistance at water/silicon interface. *International Journal of Heat and Mass Transfer*, 134, 634-640.
28. Sen T, **Barisik M** (2019) Internal surface electric charge characterization of mesoporous silica. *Nature Scientific Reports*, 9(1), 137.
27. Sen T, **Barisik M** (2018) Size Dependent Surface Charge Properties of Silica Nano-Channels: Double Layer Overlap and Inlet/Outlet Effects. *Physical Chemistry Chemical Physics*, 20:16719-16728.
26. Sabet S, Mobedi M, **Barisik M**, Nakayama A (2018) Heat Transfer Enhancement by Aligned Solid Blocks with Intraparticle Parallel Pores. *International Journal of Numerical Methods for Heat and Fluid Flow*, 28(11):2716-2733.
25. Nguyen CT, **Barisik M**, Kim BH (2018) Wetting of Chemically Heterogeneous Striped Surfaces: Molecular Dynamics Simulations. *AIP Advances*, 8, 065003.
24. **Barisik M** (2018) Modelling Wetting Behavior of Silica Surfaces by Molecular Dynamics. *Journal of The Faculty of Engineering and Architecture of Gazi University*, 33(1), 337-344.
23. Celebi AT, **Barisik M**, Beskok A (2018) Surface charge controlled transport of water in graphene nano-channels. *Microfluidics Nanofluidics*, 22(1):7.
22. Celebi AT, **Barisik M**, Beskok A (2017) Electric field controlled transport of water in graphene nano-channels. *The Journal of Chemical Physics*, 147(16):164311.
21. Kalyoncu G, **Barisik M** (2017) Analytical solution of micro-/nanoscale convective liquid flows in tubes and slits. *Microfluidics Nanofluidics*, 21(9):147.
20. Vo T, **Barisik M**, Kim BH (2016) Atomic Density Effects on Temperature Characteristics and Thermal Transport at Grain Boundaries through a Proper Bin Size Selection. *Physical Review E*, 144, 194707.
19. Kalyoncu G, **Barisik M** (2016) The extended Graetz problem for micro-slit geometries; analytical coupling of rarefaction, axial conduction and viscous dissipation. *International Journal of Thermal Sciences*, 110: 261–269.
18. **Barisik M**, Beskok A (2016) ‘Law of the Nano-Wall’ in Nano-Channel Gas Flows. *Microfluidics Nanofluidics*, 20(3): 46.
17. Pham TA, **Barisik M**, Kim BH (2016) Interfacial Thermal Resistance between The Graphene-Coated Copper and Liquid Water. *Int. J. of Heat and Mass Transfer*, 97: 422–431.
16. Vo T, **Barisik M**, Kim BH (2015) Near Surface Viscosity Effects on Capillary Rise of Water in Nanotubes. *Physical Review E*, 92, 053009.
15. **Barisik M**, Yazicioglu AG, Cetin B, Kakac S (2015) Analytical Solution of Thermally Developing Microtube 15. Heat Transfer Including Axial Conduction, Viscous Dissipation, and Rarefaction Effects. *International Communications in Heat and Mass Transfer*, 67: 81–88.
14. **Barisik M**, Beskok A (2015) Molecular Free Paths in Nano-Scale Gas Flows. *Microfluidics Nanofluidics*, 18(5-6):1365-1371.
13. **Barisik M**, Beskok A (2014) Scale Effects in Gas Nano Flows. *Physics of Fluids*, 26:052003.
12. Atalay S, **Barisik M**, Qian S, Beskok A (2014) Surface Charge of a Nanoparticle Interacting with a Flat Substrate, *Journal of Physical Chemistry C*, 118(20):10927–10935.

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11. **Barisik M**, Atalay S, Qian S, Beskok A (2014) Size dependent surface charge properties of silica nanoparticles. *Journal of Physical Chemistry C*, 118(4):1836–1842.
 10. Pham TA, **Barisik M**, Kim BH (2014) Molecular Dynamics Simulations of Kapitza Length for Argon-Silicon and Water-Silicon Interfaces. *International Journal of Precision Engineering and Manufacturing*, 15(2): 323-329.
 9. **Barisik M**, Beskok A (2013) Temperature Dependence of Thermal Resistance at the Water/Silicon Interface. *International Journal of Thermal Sciences*, 77:47–54.
 8. Pham TA, **Barisik M**, Kim BH (2013) Pressure Dependence of Kapitza Resistance at Gold/Water and Silicon/Water Interfaces. *Journal of Chemical Physics*, 139:244702.
 7. **Barisik M**, Beskok A (2013) Wetting Characterization of Silicon (1,0,0) Surface. *Molecular Simulation*, 39(9):700–709. *Selected as the cover article.*
 6. **Barisik M**, Beskok A (2012) Boundary Treatment Effects on Molecular Dynamics Simulations of Interface Thermal Resistance. *Journal of Computational Physics*, 231:7881–7892.
 5. Shi Z, **Barisik M**, Beskok A (2012) Molecular dynamics modeling of thermal resistance at argon-graphite and argon-silver interfaces. *International Journal of Thermal Sciences*, 59:29–37.
 4. **Barisik M**, Beskok A (2012) Surface–Gas Interaction Effects on Nanoscale Gas Flows. *Microfluidics Nanofluidics*, 13(5):789–798.
 3. **Barisik M**, Beskok A (2011) Molecular Dynamics Simulations of Shear Driven Gas Flows in Nano-Channels. *Microfluidics Nanofluidics*, 11(5):611–622.
 2. **Barisik M**, Beskok A (2011) Equilibrium Molecular Dynamics Studies on Nanoscale-confined Fluids. *Microfluidics Nanofluidics*, 11(3):269-282.
 1. **Barisik M**, Kim B, Beskok A (2010) Smart Wall Model for Molecular Dynamics Simulations of Nanoscale Gas Flows. *Communications in Computational Physics* 7:977–993.

Conference Proceedings

1. **Barisik M** (2016) Molecular Modeling of Force Driven Gas Flows in Nano-channels. 9th International Conference on Computational Fluid Dynamics, ICCFD9-2016-284.
2. **Barisik M**, Shi Z, Beskok A (2012) Heat Conduction and Interface Thermal Resistance in Liquid Argon Filled Silver and Graphite Nanochannels. ASME 3th Micro/Nanoscale Heat & Mass Transfer International Conference, doi:10.1115/MNHMT2012-75231.
3. **Barisik M**, Beskok A (2011) MD Simulations of Nano-Scale Gas Flows: A Case Study of Couette Flow at Kn=10. 27th AIP Conference Proceedings, 1333:707–711, doi:10.1063/1.3562729.

Conference Presentations

1. **Barisik M** (2018) Calculating and Modeling Micro/nano-scale Effects in Fluid Transport, 14th Nanoscience and Nanotechnology Conference, Cesme, Turkey, September.
2. Alan BO, **Barisik M** (2018) Surface Charge Properties of Mesoporous Silica Nanoparticles, 14th Nanoscience and Nanotechnology Conference, Cesme, Turkey, September.
3. Yenigun O, **Barisik M** (2018) Molecular Dynamics Studies on Thermal Resistance Between Water and Silicon Nano-films with Different Thicknesses, 14th Nanoscience and Nanotechnology Conference, Cesme, Turkey, September.
4. Sen T, **Barisik M** (2018) Characterization of Surface Charge Properties Inside Mesoporous Silica, 14th Nanoscience and Nanotechnology Conference, Cesme, Turkey, September.
5. **Barisik M**, Sen T (2018) Electrical Double Layer Overlap and Inlet/Outlet Effects on Surface Charge of Silica Nanochannels. ASME 16th International Conference on Nanochannels, Microchannels, and Minichannels, Dubrovnik, Croatia, June.
6. **Barisik M**, Ozcelik G (2018) Nanoscale Roughness Effects on Electrical Charge of Silica Surfaces. ASME 16th International Conference on Nanochannels, Microchannels, and Minichannels, Dubrovnik, Croatia, June.
7. Sen T, **Barisik M** (2017) Electrokinetic Effects on Nano-Scale Liquid Transport in Porous Media, International Porous and Powder Materials Symposium and Exhibition, Aydın, Turkey, September.

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8. Ozcelik G, **Barisik M** (2017) Micro/Nano-Scale Wetting Behavior of Nano-Patterned Silica Surfaces, International Porous and Powder Materials Symposium and Exhibition, Aydın, Turkey, September.
 9. Kalyoncu G, **Barisik M** (2017) Investigation of Liquid Transport in Micro and Nanoscale Porous Media at Different Pore to Throat Size Ratios, International Porous and Powder Materials Symposium and Exhibition, Aydın, Turkey, September.
 10. Sabet S, **Barisik M** (2017) Investigation of Gas Transport in Micro and Nanoscale Porous Media at Different Pore to Throat Size Ratios, International Porous and Powder Materials Symposium and Exhibition, Aydın, Turkey, September.
 11. **Barisik M** (2016) Molecular Modeling of Force Driven Gas Flows in Nano-channels. 9th International Conference on Computational Fluid Dynamics, Istanbul, Turkey, July.
 12. Celebi AT, Ghorbanian J, **Barisik M**, Beskok A (2016) Molecular Dynamics Simulations of Water Confined in Graphene Nanochannels. ASME14th International Conference on Nanochannels, Microchannels, and Minichannels, Washington,DC, USA, July.
 13. **Barisik M**, Beskok A (2016) Modeling Surface Force Effects on Nanochannel Gas Mass Transport. ASME14th International Conference on Nanochannels, Microchannels, and Minichannels, Washington, DC, USA, July.
 14. Sabet S, **Barisik M**, Mobedi M (2015) A pore scale study for heat transfer in porous media, International Porous and Powder Materials Symposium and Exhibition, Izmir, Turkey, September.
 15. **Barisik M**, Beskok A (2015) Molecular Free Paths in Nano-Scale Gas Flows. ASME13th International Conference on Nanochannels, Microchannels, and Minichannels, San Francisco,CA, USA, July.
 16. **Barisik M**, Beskok A (2014) Scale Effects in Force Driven Nano Channel Gas Flows. ASME12th International Conference on Nanochannels, Microchannels, and Minichannels, Chicago,IL, USA, August.
 17. **Barisik M**, Beskok A (2014) Temperature Dependence of the Water-Silicon Interface Thermal Resistance. ASME12th International Conference on Nanochannels, Microchannels, and Minichannels, Chicago, Illinois USA, August.
 18. **Barisik M**, Beskok A (2014) Wetting of Nano-Scale Water Droplets on Silicon Surfaces. ASME12th International Conference on Nanochannels, Microchannels, and Minichannels, Chicago, Illinois USA, August.
 19. **Barisik M**, Beskok A (2012) MD Simulations of Gas Flows in Nanochannels. ASME10th International Conference on Nanochannels, Microchannels, and Minichannels, Puerto Rico, USA, July.
 20. **Barisik M**, Beskok A (2012) MD Simulations of Thermal Resistance at the Solid-Liquid Interface. ASME10th International Conference on Nanochannels, Microchannels, and Minichannels, Puerto Rico, USA, July.
 21. **Barisik M**, Shi Z, Beskok A (2012) Heat Conduction and Interface Thermal Resistance in Liquid Argon Filled Silver and Graphite Nanochannels. ASME 3rd Micro/Nanoscale Heat & Mass Transfer International Conference, Atlanta, GA, USA, March.
 22. **Barisik M**, Beskok A (2011) MD Simulations Nanoscale Gas Flows. ASME Society-Wide Micro and Nano Technology Forum, Denver, CL, USA, November.
 23. **Barisik M**, Beskok A (2011) Interface Thermal Resistance between Liquid Argon and Various Solids. ASME Society-Wide Micro and Nano Technology Forum, Denver, CL, USA, November.
 24. **Barisik M**, Beskok A (2011) Surface-Gas Interaction Effects on Nanoscale Gas Flows. 64nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore, MD, November.
 25. **Barisik M**, Beskok A (2010) Surface Effects on Nanoscale Gas Flows. 63rd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Long Beach, CA, USA, November.
 26. **Barisik M**, Beskok A (2010) MD Simulations of Nano-Scale Gas Flows: A Case Study of Couette Flow at $Kn=10$. 27th International Symposium on Rarefied Gas Dynamics, Pacific Grove, California, July.
 27. **Barisik M**, Kim B, Beskok A (2009) Molecular Dynamics Simulations of Nanoscale Gas Flows. 62nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Minneapolis, Minnesota, USA, November.
 28. **Barisik M**, Beskok A (2009) Molecular Dynamics Simulations. North Atlantic Treaty Organization (NATO) Advanced Study Institute on Microfluidic Based Microsystems, Izmir,Turkey, September.

Invited Talks

1. **Barisik M** (2018) Calculating and Modeling Micro/nano-scale Effects in Fluid Transport, 2018 Symposium on Advances in Thermal and Fluid Sciences, Urla, Turkey, June.
2. **Barisik M** (2018) Molecular Level Investigation of Nanoscale Interface Thermal Resistance, 7th Condense Matter Physics Meeting, Urla, Turkey, Nisan.
3. **Barisik M** (2017) Molecular Level Investigation of Nanoscale Interface Thermal Resistance, Recent Progress in the Physics of Thermal Transport, Urla, Turkey, June.
4. **Barisik M** (2017) Molecular Level Investigation of Nanoscale Interface Thermal Resistance, Sabanci University, Istanbul, Turkey, June.

PROFESSIONAL ACTIVITIES

Organizer of the Following International Conferences

- International Porous and Powder Materials Symposium and Exhibition, Mugla, Turkey, September 2019
- 14th Nanoscience and Nanotechnology Conference, Cesme, Turkey, September 2018
- Symposium on Advances in Thermal and Fluid Sciences, Urla, Turkey, June 2018
- International Porous and Powder Materials Symposium and Exhibition, Aydın, Turkey, September 2017

Track Organizer for the Following International Conferences

- ASME16th International Conference on Nanochannels, Microchannels, and Minichannels, Dubrovnik, Croatia, July, 2016. Organizer of “Technical 1-1: Fundamentals of Flow and Heat Transfer in Microchannels, Technical 1-3: Mass Transfer, Droplet Impingement and Supercritical Pressure Studies, Technical 8-1: Electrokinetics”
- ASME14th International Conference on Nanochannels, Microchannels, and Minichannels, Washington, DC, USA, July, 2016. Organizer of “Track 11 Modeling and Simulation”

Referee for the Following Professional Journals

- Nature Communications
- Microfluidics and Nanofluidics
- Chemical Physics Letters
- Physics of Fluids
- International Journal of Thermal Sciences
- Langmuir
- The Journal of Chemical Physics
- International Journal of Heat and Mass Transfer
- The Journal of Physical Chemistry
- Physical Chemistry Chemical Physics
- ASME Journal of Fluids Engineering
- International Journal of Thermophysics

Referee for the Following International Conferences

- ASME16th International Conference on Nanochannels, Microchannels, and Minichannels, Croatia, 2018.
- ASME14th International Conference on Nanochannels, Microchannels, and Minichannels, USA, 2016.
- ASME11th International Conference on Nanochannels, Microchannels, and Minichannels, Japan, 2013.
- ASME10th International Conference on Nanochannels, Microchannels, and Minichannels, USA, 2012.
- 7th Nanoscience and Nanotechnology Conference of Turkey, Istanbul, Turkey, June 2011.