Sadaf Sobhani

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EDUCATION

2019	**Stanford University** Ph.D. in Mechanical Engineering Computational and experimental investigation of flow and combustion physics in porous media *Advisor*: Matthias Ihme
2015	**Stanford University** M.S. in Mechanical Engineering
2014	**Stanford University** B.S. in Mechanical Engineering
2013	**Corpus Christi College, University of Oxford** Study abroad in History of Mathematics *Advisor*: Christopher Hollings

PROFESSIONAL EXPERIENCE

2020–present	**Assistant Professor**, Mechanical and Aerospace Engineering, Cornell University, Ithaca, NY
2019–2020	**Visiting Assistant Professor**, Mechanical and Aerospace Engineering, Cornell University, Ithaca, NY
2019–2020	**Postdoctoral Research Staff**, Lawrence Livermore National Laboratory, Livermore, CA
2018	**Research Associate**, NASA Ames Research Center, Mountain View, CA
2016	**Schneider Fellow**, United Nations Foundation, Washington D.C.
2014	**Research Intern**, Robert Bosch Research and Technology Center, Palo Alto, CA

AFFILIATIONS

2022–	Cornell Center for Materials Research, Faculty Member
2021–	Cornell Energy Systems Institute Affiliated Faculty
2021–	Cornell Atkinson Center for Sustainability Faculty Fellow
2020–	Lawrence Livermore National Laboratory, Scientific Collaborator

AWARDS AND FELLOWSHIPS

2021	PCCW Affinito-Stewart Grant
2016–2019	Graduate Research Fellow, National Science Foundation
2018	Gallery of Fluid Motion Award, American Physical Society Division of Fluid Dynamics
2018	Graduate Voice & Influence Fellow, Clayman Institute for Gender Research at Stanford University
2017	Art of Science Award, Stanford Materials Research Society
2017	Best Poster Award, Stanford Mechanical Engineering Conference
2017	Accel Fellow, Accel Leadership Program, Stanford Technology Ventures Program
2016	Graduate Public Service Fellow, Stanford Haas Center for Public Service
2016	Enhancing Diversity in Graduate Education Fellow, Stanford Vice Provost for Graduate Education ($13K)
2016	Schneider/MAP Sustainable Energy Fellow, Stanford Haas Center for Public Service

PUBLICATIONS

Book Chapters

2022 Panerai, F., **Sobhani, S.** "Thermal Protection and Control", in: Mission Planning and Execution for Interplanetary Travel In press.

Journal Articles

2021 Corral, D., Feaster, J., **Sobhani, S.**, DeOtte, J.R., Lee, D., Wong, A. A., Hamilton, J., Beck, V., Sarkar, A., Hahn, C., Jaramillo, T., Baker, S.E., Duoss, E. B. Advanced Manufacturing for High Yield Electrosynthesis of Fuels and Chemicals from CO2, *Energy & Environmental Science*

2021 **Sobhani, S.**, Muhunthan, P., Boigne, E., Mohaddes, D., Ihme, M., Experimental feasibility of tailored porous media burners enabled via additive manufacturing, *Proceedings of the Combustion Institute*, 38 (2), 2127-2134.

2021 Ferguson, J. C., **Sobhani, S.**, Ihme, M., Pore-resolved simulations of porous media combustion with conjugate heat transfer, *Proceedings of the Combustion Institute*, 38 (4), 6713-6722.

2020 **Sobhani, S.**, Allan, S., Muhunthan, P., Boigne, E., Ihme, M., Additive Manufacturing of Tailored Macroporous Ceramic Structures for High- Temperature Applications, *Advanced Engineering Materials*, 22(8), 2000158. Cover

2020 **Sobhani, S.**, Legg, J., Bartz, D., Sullivan, J., Kojima, J., Moder, J., Ihme M., Experimental investigation of lean premixed pre-vaporized liquid-fuel combustion in porous media burners at elevated pressures up to 20 bar. *Combustion and Flame*, 212, 123-134.

2019 Bassenne, M., Banko, A., **Sobhani, S.**, Painting fluid motion using convolutional neural networks: An Album of Fluid Motion 2.0, *Physical Review Fluids* 4 (10), 100513.

2019 **Sobhani, S.**, Mohaddes, D., Boigne, E., Muhunthan, P., Ihme, M., Modulation of heat transfer for extended flame stabilization in porous media burners via topology gradation, *Proceedings of the Combustion Institute* 37 (4), 5697-5704.

2018 Boigne, E., Muhunthan, P., Mohaddes, D., Wang, Q., **Sobhani, S.**, Hinshaw, W., Ihme, M., X-ray computed tomography for flame-structure analysis of laminar premixed flames, *Combustion and Flame* 200, 142-154.

2017 Dunnmon, J., **Sobhani, S.**, Kim, T. W., Kovscek, A., Ihme, M., An investigation of internal flame structure in porous media combustion via X-ray Computed Tomography, *Proceedings of the Combustion Institute* 36 (3), 4399-4408.

2015 Dunnmon, J., **Sobhani, S.**, Wu, M., Fahrig, R., Ihme, M., Characterization of scalar mixing in dense gaseous jets using X-ray computed tomography, *Experiments in Fluids* 56 (10), 1-17.

Conference Proceedings

2021 D'Orazio, G., Yasgur, M., **Sobhani, S.** Combustion performance characterization in additively manufactured porous media burners, 12th U.S. National Combustion Meeting

2019 **Sobhani, S.**, Muhunthan, P., Mohaddes, D., Boigne, E., Ihme, M., Enabling Tailored Porous Media Burners via Additive Manufacturing, 11th U.S. National Combustion Meeting

2017 **Sobhani, S.**, Haley, B., Bartz, D., Dunnmon, J., Sullivan, J., Ihme, M., Investigation of lean combustion stability, pressure drop, and material durability in porous media burners, ASME Turbo Expo 2017: Turbomachinery Technical Conference and Exposition

2016 Dunnmon, J., Wu, M., Xia, Y., **Sobhani, S.**, Fahrig, R., Ihme, M., 3-D flame characterization via x-ray computed tomography, 24th International Congress of Theoretical and Applied Mechanics Vol. 2, pp. 605-606

Other publications

2016 **Sobhani, S.**, Air Pollution from Gasoline Powered Vehicles and the Potential Benefits of Ethanol Blending: A Review of Particulate, Nitrogen Oxide, and Volatile Organic Compound Pollution, Energy Future Coalition

CONFERENCE ACTIVITIES

Conference leadership

2021 Session chair — Novel Concepts, 38th International Symposium on Combustion (Jan. 25–29) Online

2020 Session chair — 12th Annual Meeting Interpore (Aug. 31- Sept. 4), Online

2019 Session chair — 11th Annual Meeting Interpore (May 6-10), Valencia, Spain

2019 Mini-symposium organizer — Numerical modeling and simulation of combustion in porous media, Seventeenth International Conference on Numerical Combustion (May 6-8), Aachen, Germany

2017 Session chair — Reacting Flows, Modeling and Simulations, 70^{th} Annual Meeting of the American Physical Society Division of Fluid Dynamics (Nov. 19-21), Denver, CO

2017 Session chair — Practical Systems, Sixteenth International Conference on Numerical Combustion (April 3-5), Orlando, FL

2017 Panelist — Energy Conversion and Management, Bosch Energy Research Network Symposium (July 28), Palo Alto, CA

Invited Talks

2022 Mechanical and Aerospace Engineering department seminar, Syracuse University (Feb. 7), Syracuse, NY
2021 Scientific Computing and Numerics (SCAN) seminar, Cornell University (Nov. 15), Ithaca, NY
2021 Mechanical Engineering department seminar, Pennsylvania State University (Oct. 5), State College, PA
2021 International Conference on Additive Manufacturing, ASTM (Oct. 1), Hybrid/Anaheim, CA
2021 Energy Seminar Series, Cornell Energy Systems Institute (Sept. 23), Ithaca, NY
2021 Ceramitec AM Ceramics conference (Sept. 16), Hybrid/Munich, Germany
2021 Mechanical Engineering department seminar, University of New Hampshire (April 2), Online
2020 Civil Engineering and Engineering Mechanics Seminar, Columbia University (March 10), New York, NY
2019 Division Seminar, NASA Ames Research Center (Oct. 28), Mountain View, CA
2019 Global Ethanol Summit, U.S. Grains Council (Oct. 14), Washington, DC (News article)
2019 Computational Engineering, Lawrence Livermore National Laboratory (June 12), Livermore, CA
2019 Mechanical & Aerospace Engineering Colloquium, Cornell University (March 7), Ithaca, NY
2017 Bosch Energy Research Network Symposium (July 28), Palo Alto, CA

Oral presentations

2021 Corral, D., Feaster, J., **Sobhani, S.**, DeOtte, J.R., Lee, D., Wong, A. A., Hamilton, J., Beck, V., Sarkar, A., Hahn, C., Jaramillo, T., Baker, S.E., Duoss, E. B. , "Advanced Manufacturing for Electrosynthesis of Fuels and Chemicals from CO2", 240th Electrochemical Society Meeting (October 10–14), Online

2021 Saleh, S., D'Orazio, G., **Sobhani, S.** , "Controlling gas diffusion layer wettability via additive manufacturing and simulation", 13th Annual Meeting Interpore (May 31–June 4), Online

2021 D'Orazio, G., Yasgur, M., **Sobhani, S.** , "Additive manufacturing via digital light processing of durable ceramic porous structures for application to combustion systems", 13th Annual Meeting Interpore (May 31–June 4), Online

2021 D'Orazio, G., Yasgur, M., **Sobhani, S.** "Combustion performance characterization in additively manufactured porous media burners", 12th U.S. National Combustion Meeting (May 24–26) Online

2021 **Sobhani, S.**, Mohaddes, D., Boigne, E., Muhunthan, P., Ihme, M., "Experimental feasibility of tailored porous media burners enabled via additive manufacturing", 38th International Symposium on Combustion (Jan. 25–29) Online

2020 **Sobhani, S.**, Muhunthan, P., Boigne, E., Allan, S., Ihme, M., "Printing ceramic structures for high-temperature applications", International Conference and Exposition on Advanced Ceramics and Composites (Jan. 26–31), Daytona Beach, FL

2019 **Sobhani, S.**, Ferguson, J. C., Ihme, M., "Direct numerical simulation and characterization of flame propagation regimes in porous inert media", 11th Annual Meeting Interpore (May 6-10), Valencia, Spain

2019 **Sobhani, S.**, Ferguson, J. C., Ihme, M., "Flame-structure analysis of porous-media combustion through pore-resolving simulations", Seventeenth International Conference on Numerical Combustion (May 6-8), Aachen, Germany

2019 **Sobhani, S.**, Muhunthan, P., Boigne, E., Mohaddes, D., Ihme, M., "Tailoring Porous Media Burners", Thermal and Fluid Sciences Industrial Affiliates and Sponsors Conference (Feb. 5-6), Stanford, CA

2018 **Sobhani, S.**, Apte, S., Ihme, M., "Flow field statistics and scaling in random 2D porous media", 71^{st} Annual Meeting of the American Physical Society Division of Fluid Dynamics (Nov. 18-20), Atlanta, GA

2018 **Sobhani, S.**, Mohaddes, D., Boigne, E., Muhunthan, P., Ihme, M., "Modulation of heat transfer for extended flame stabilization in porous media burners via topology gradation", 37th International Symposium on Combustion (July 29–Aug. 3) Dublin, Ireland

2018 **Sobhani, S.**, Muhunthan, P., Boigne, E., Mohaddes, D., Ihme, M., "Matrix-stabilized flames", Thermal and Fluid Sciences Industrial Affiliates and Sponsors Conference (Feb. 1-2), Stanford, CA

2017 **Sobhani, S.**, Muhunthan, P., Boigne, E., Mohaddes, D., Ihme, M., "Investigation of pore-scale flow physics in porous media burners", 70^{th} Annual Meeting of the American Physical Society Division of Fluid Dynamics (Nov. 19-21), Denver, CO

2017 **Sobhani, S.**, Panerai, F., Borner, A., Ferguson, J. C., Wray, A., Mansour, N.N., "Radiative Heat Transfer Modeling in Fibrous Porous Media", 9^{th}Ablation Workshop (Aug. 30-31), Bozeman, MT

2017 **Sobhani, S.**, Haley, B., Bartz, D., Dunnmon, J., Sullivan, J., Ihme, M., "Investigation of lean combustion stability, pressure drop, and material durability in porous media burners", ASME Turbo Expo 2017: Turbomachinery Technical Conference and Exposition (June 26-30), Charlotte, NC

2017 **Sobhani, S.**, Mohaddes, D., Ihme, M., "Numerical Investigation and Optimization of Porous Media Burners", Sixteenth International Conference on Numerical Combustion (April 3-5), Orlando, FL

2017 **Sobhani, S.**, Muhunthan, P., Boigne, E., Mohaddes, D., Sinha S., Dunnmon, J., Ihme, M., "Low emission combustion in porous media burners", Thermal and Fluid Sciences Industrial Affiliates and Sponsors Conference (Jan. 19-20), Stanford, CA

2016 **Sobhani, S.**, Haley, B., Bartz, D., Dunnmon, J., Sullivan, J., Ihme, M., "Investigation of lean combustion stability and pressure drop in porous media burners", 69^{th} Annual Meeting of the American Physical Society Division of Fluid Dynamics (Nov. 20-22), Portland, OR

2016 **Sobhani S.** and Ihme, M., "Matrix-stabilized flames: The tortuous path to establish advanced combustion technologies", Clean Energy Education & Empowerment (May. 31), Stanford, CA

2015 **Sobhani, S.**, Dunnmon, J., Werer M., Ihme, M., "Coupling micro-CT with computer simulations to analyze dispersion in porous media", 68^{th}Annual Meeting of the American Physical Society Division of Fluid Dynamics (Nov. 22-24), Boston, MA

TEACHING

Cornell Combustion Processes (Fall '20, '21), Spacecraft Thermal Protection and Control (Spring '22)
Stanford Physics of Wind Energy (Fall '18), Fluid Mechanics (Fall '17)

OUTREACH AND PROFESSIONAL SERVICE

2018– present **Referee**, *Journal of Fluid Mechanics, International Journal of Heat and Mass Transfer, Combustion and Flame, Proceedings of the Combustion Institute, Fuel, Fuel Communications*

2020 **Research mentor**, The Bronx High School of Science, Mentoring high-school students interested in scientific research in the Sobhani Lab

2020 **Proposal reviewer**, ENVISION Women in STEM, Research proposal-writing initiative supporting female high school students for future STEM careers

2020 **Panelist**, STEMxx Chats, Helping young women succeed in STEM career paths

2017–2019 **Director**, seeME High School Outreach (News article)

2016–2019 **Vice-President**, Stanford Women in Fluid Dynamics

2016 **Graduate student research mentor**, RISE Raising Interest in Science and Engineering Summer Internship Program