

Amy Q. Shen

Provost and Professor

Fellow of the American Physical Society, Royal Society of Chemistry, and Society of Rheology
Okinawa Institute of Science and Technology (OIST), Japan

Email: amy.shen@oist.jp

ORCID: 0000-0002-1222-6264

Google Scholar: scholar.google.com/citations?user=uiuQAVAAAAAJ

Research Group: www.oist.jp/research/research-units/mbnu/amy-shen

Amy Q. Shen is Professor of Micro/Bio/Nanofluidics and Provost at the Okinawa Institute of Science and Technology (OIST), where she leads both an internationally recognized research unit and the university's academic affairs. Since joining OIST in 2014, she has led the Micro/Bio/Nanofluidics Unit; previously, she held faculty positions in Mechanical Engineering at the University of Washington and in Mechanical and Aerospace Engineering at Washington University in St. Louis, USA. Her research couples microfluidics with rheology to create precision experimental platforms for studying complex fluid physics, soft matter, and transport phenomena, while translating physical insights to biosensing, disease diagnostics, and biomedical and environmental applications. By integrating advanced imaging, free-surface flows, and nanophotonics, she has revealed how flow, deformation, and confinement govern complex fluids and living systems across scales. Professor Shen is a Fellow of the American Physical Society, the Royal Society of Chemistry, and the Society of Rheology. Her honors include the NSF CAREER Award, a Fulbright Scholarship, the Ralph E. Powe Junior Faculty Enhancement Award, and selection to Forbes JAPAN's Women in Tech 30 (2026).

ACADEMIC POSITIONS

Provost , Okinawa Institute of Science and Technology (OIST)	10/2022–present
Professor , Micro/Bio/Nanofluidics Unit, OIST	07/ 2014–present
Tenured Associate Professor , Mechanical Engineering, University of Washington	09/2008–06/2014
Assistant Professor , Mechanical and Aerospace Engineering, WUSTL	09/2002–08/ 2008

EDUCATION

Postdoctoral Fellow , Engineering and Applied Science, Harvard University	9/00–8/02
Ph.D. , Theoretical and Applied Mechanics, University of Illinois at Urbana–Champaign	7/96–7/00
Geophysical Fluid Dynamics Summer Fellow , Woods Hole Oceanographic Institution	5/98–8/98
M.S. , Civil and Environmental Engineering, University of Illinois at Urbana–Champaign	9/94–5/96
M.S. , Engineering Mechanics, with Highest Honors, Tongji University	8/92–8/94
B.S. , Engineering Mechanics, Hunan University	8/89–8/92

HONORS AND DISTINCTIONS

Forbes JAPAN Women in Tech 30	2026
Annual FLOW Lecturer, KTH Royal Institute of Technology, Sweden	2025
Fellow, Society of Rheology	2022
Fellow, American Physical Society, Division of Fluid Dynamics	2021
Fellow, Royal Society of Chemistry	2021
Excellence in Mentoring Award, OIST	2020
Bergveld Lecturer, University of Twente, The Netherlands	2019
Fulbright Scholar	2013–2014
National Science Foundation CAREER Award, USA	2007–2012
Best Paper Award, Particle Technology Forum, AIChE Annual Meeting	2008
Ralph E. Powe Junior Faculty Enhancement Award	2003

SCHOLARLY IMPACT

Professor Shen has authored 236 peer-reviewed publications that have received more than 8,800 citations (Google Scholar; h-index = 50). Her work has appeared in leading journals including *Nature Materials*, *Physical Review X*, *Physical Review Letters*, *Proceedings of the National Academy of Sciences*, *Journal of Fluid Mechanics*, *ACS Sensors*, and *Biosensors and Bioelectronics*. She has delivered more than 110 invited, keynote, and plenary lectures worldwide in the past 10 years, including plenary lectures at the International Soft Matter Conference, the Society of Rheology Annual Meeting, the International Congress on Rheology, the World Congress on Biosensors, International NanoMedicine Conference, and the MicroTAS Conference, reflecting international recognition across both the physical sciences and biotechnology communities. Her research has resulted in 9 patents and patent applications and has contributed to the training of 23 PhD students and 41 postdoctoral researchers.

RESEARCH CONTRIBUTIONS AND SELECTED HIGHLIGHTS

Professor Shen's research has established fundamental principles for understanding how flow, deformation, and confinement reorganize complex fluids, soft materials, and living systems far from equilibrium. Her work connects molecular-scale dynamics, microstructural evolution, elastic stress generation, interfacial phenomena, and macroscopic transport in complex fluids. By combining microfluidics, rheology, free-surface flows, nanophotonics, and advanced imaging, she has created precision experimental frameworks for discovering nonlinear flow phenomena that are difficult to access using conventional approaches while extending microscale physical principles to biological and biomedical systems.

- **Flow-induced nonequilibrium structure formation.** Discovered that strong flow deformation can induce irreversible nanogel formation and emergent material states in complex fluids, establishing flow as an active mechanism for creating new soft materials and structures.
- **Elastic instabilities, turbulence, and transport in complex fluids.** Revealed how elastic stresses generated by flow drive inertioelastic instabilities, elastic turbulence, and chaotic transport. Established stagnation points as fundamental organizing structures governing stress generation and transport in viscoelastic flows, canopy flows, and porous media.
- **Extensional rheology and molecular origins of stress generation.** Developed experimental frameworks connecting molecular stretching, molecular architecture, and polydispersity to elastocapillary thinning, filament stability, and extensional flow behavior, helping bridge molecular-scale physics and macroscopic rheology.
- **Microfluidics as a precision scientific instrument.** Advanced the use of microfluidics, rheology, and advanced imaging as quantitative experimental platforms for fundamental discovery, enabling controlled studies of complex fluids, soft materials, microbial systems, and living matter under flow, deformation, and confinement. This work helped transform microfluidics from a technological platform into a rigorous framework for probing fundamental physical and biological processes.
- **Physical principles in biological and living systems.** Applied concepts from transport phenomena, confinement, and interfacial physics to understand microbial communities, cellular behavior, and biosensing systems, creating new experimental approaches at the interface of physical sciences and biotechnology.

TRANSLATIONAL IMPACT

Professor Shen has translated fundamental discoveries in microscale transport phenomena and interfacial physics into innovative technologies for biotechnology, healthcare, and environmental monitoring. Her research has enabled microfluidic and nanophotonic platforms for intracellular delivery, microbial biofilm analysis, multiplexed cancer diagnostics, cortisol sensing, environmental monitoring, and rapid disease detection. By advancing label-free biosensing and precision diagnostic technologies, her work has created new opportunities for biological analysis and real-time health monitoring. Several innovations have resulted in patents and patent applications, demonstrating a strong track record of translating fundamental science into practical technologies. Together, these achievements illustrate the broader societal impact of her research, providing solutions for human health, environmental sustainability, and societal resilience.

SCIENTIFIC LEADERSHIP AND SERVICE

Professor Shen's scientific leadership extends across the physical sciences, engineering, and biotechnology communities. Through editorial service, international peer review, scientific advisory activities, conference leadership, and award committees, she contributes to advancing research excellence and recognizing scientific achievement.

Editorial leadership: Associate Editor, *Soft Matter* (2020–present); Editorial Board Member, *Biosensors and Bioelectronics* (2025–present) and *Journal of Rheology* (2022–2025); Editorial Advisory Board Member, *ACS Sensors*, *Biomechanics*, and *VIEW*. Through these roles, Professor Shen helps shape research directions across soft matter physics, rheology, microfluidics, biosensing, and biotechnology.

Leadership in the international scientific community: Member-at-Large, APS Division of Fluid Dynamics (2024–2027); Chair, APS DFD Acrivos Award Committee (2022–2024); Member, Society of Rheology Metzner Award Committee (2020–2022); International Advisory Board Member, XIXth International Congress on Rheology. She has served on major international funding and scientific review panels, including the European Research Council (ERC), Horizon 2020/Horizon Europe, the U.S. National Science Foundation (NSF), the Hong Kong Research Grants Council (RGC), and other international funding agencies. She is regularly called upon to evaluate research proposals, scientific programs, faculty appointments, and major research initiatives worldwide.

ACADEMIC LEADERSHIP

As Provost of the Okinawa Institute of Science and Technology (OIST), an English-speaking international graduate university in Japan established in 2011, Professor Shen provides strategic leadership for academic affairs and the research enterprise across an institution with approximately 100 research units and a highly international community of faculty, researchers, and Ph.D students. OIST serves as a gateway between Japan and the global scientific community, promoting interdisciplinary research, international researcher mobility, cross-border collaboration, and open exchange of ideas. Working closely with the President, Board of Governors, executive leadership, and government stakeholders, Professor Shen helps guide OIST's academic strategy, faculty recruitment, evaluation and promotion, graduate education, research programs, institutional initiatives, domestic and international partnerships, and academic–industry collaboration. Her leadership strengthens research excellence, institutional funding efforts, innovation, and OIST's international scientific profile. Prior to her appointment as Provost, she chaired OIST's Appointment and Promotion Committee and served in institutional leadership roles supporting faculty recruitment, evaluation, governance, and graduate education.

MENTORSHIP AND TRAINING

Professor Shen has supervised 23 PhD students and mentored 41 postdoctoral researchers from diverse international backgrounds. Her former trainees have gone on to successful careers across academia, industry, government laboratories, and innovation sectors worldwide. Alumni now hold faculty positions at institutions including MIT, INSA Lyon, Swansea University, Sant'Anna School of Advanced Studies in Italy, RIKEN, the University of Fukui, Shinshu University, Wuhan University, and the Chinese Academy of Sciences, while others have assumed research and leadership positions at organizations such as Illumina, Intel, General Electric, Pacific Northwest National Laboratory (PNNL), and OIST Innovation. Recognized with the OIST Excellence in Mentoring Award, Professor Shen has demonstrated a sustained commitment to developing scientific talent through interdisciplinary training, international collaboration, outreach, and support for the next generation of scientists. She has also contributed extensively to STEM outreach and mentoring activities, including programs supporting women in engineering, pre-college students, public science education, and community engagement initiatives in the United States and Okinawa, Japan.