

Sadasivan (Sadas) Shankar: Biographical Summary

Sadasivan (Sadas) Shankar is Research Technical Manager at SLAC National Laboratory, adjunct Professor in Stanford Materials Science and Engineering, and Lecturer in the Stanford Graduate School of Business. He was an Associate in the Department of Physics at Harvard University and was the *first* Margaret and Will Hearst Visiting Lecturer in Harvard and the *first* Distinguished Scientist in Residence at the Harvard Institute of Applied Computational Sciences. He has co-instructed classes related to design of materials, computing, sustainability in materials, and has received *Excellence in Teaching* award from Harvard University. He is co-instructing a class at Stanford University on Translation for Innovations and a new class on Energy Efficient Computing. He is a co-founder of and the Chief Scientist at Material Alchemy, a “last mile” translational and independent venture that was founded to accelerate the path from materials discovery to adoption, with environmental sustainability as a key goal. In addition to research on fundamentals of Materials Design, his current research is on new architectures for specialized AI methods is exploring ways of bringing machine intelligence to system-level challenges in inorganic/biochemistry, materials, physics and new frameworks for computing inspired by nature.

Dr. Shankar’s current research and analysis on Sustainable Computing is helping provide directions for the US Department of Energy’s EES2 scaling initiatives (energy reduction in computing every generation for 1000X reduction in 2 decades) as part of the White House Plan to Revitalize American Manufacturing and Secure Critical Supply Chains for investment in research, development, demonstration, and commercial application (RDD&CA) in conventional semiconductors. In addition, his analysis is helping define maps and identify pathways for energy efficient computing received a US Department of Energy Award for *Seminal Analysis of computing energy use-ranging over 37 orders of magnitude from atoms and bits to NLP-including his early warnings about AI Energy use*. In addition, he was also awarded (along with co-authors) the IEEE/ACM Micro 25 Test of Time Award for the original paper on 3D Die Stacking: *For pioneering the microarchitectural evaluation of 3D die stacking, demonstrating its potential for substantial performance/power gains, and shaping future 3D die-stacking research*.

While in the industry, Dr. Shankar and his team have enabled several critical technology decisions in the semiconductor industrial applications of chemistry, materials, processing, packaging, manufacturing, and design rules for over nine generations of Moore’s law including *first* advanced process control application in 300 mm wafer technology; introduction of flip-chip packaging using electrodeposition, 100% Pb-elimination in microprocessors for the first time in the industry, design of new materials, devices including nano warp-around devices for the advanced semiconductor technology manufacturing, processing methods, reactors, etc. Dr. Shankar managed his team members distributed across multiple sites in the US, with collaborations in Europe and have won several awards for discovery and technology innovations. He is a co-inventor in over twenty patent filings covering areas in new chemical reactor designs, semiconductor processes, bulk and nano materials for the sub 10 nanometer generation of transistors, device structures, algorithms, and bio markers for ME/CFS and long Covid. He is also a co-author in over hundred publications and presentations in measurements, multi-physics methods spanning from quantum scale to macroscopic scales, chemical synthesis, plasma chemistry and processing, non-equilibrium transport, and machine learning methods for bridging across scales, and estimating complex materials properties.

Dr. Shankar was an invited speaker at the Vin Future “Science for Life” Symposium in Vietnam on *Semiconductors Unleashed* (2023), Clean-IT Conference in Germany on *Revolutionize Digital Systems and AI* (2023), Telluride Quantum Inspired Neuromorphic Computing Workshop (2023) on *Limiting Energy Estimates for Classical and Quantum Information Processing*, Argonne National Laboratory Director’s Special Colloquium on the *Future of Computing* (2022), panelist on Carnegie Science series on *Brain and Computing* (2020), lecturer in the Winter Course on *Computational Brain Research* in IIT-M-India (2020), invited participant in the Kavli Institute of Theoretical Physics program on *Cellular Energetics* in UCSB (2019), invited speaker to the Camille and Henry Dreyfus Foundation meeting on *Machine Learning for problems in Chemistry and Materials Science* (2019), a Senior Fellow in UCLA Institute of Pure and Applied Mathematics during the program on *Machine Learning and Many-body Physics* (2016), invited to the White House event for starting of the *Materials Genome Initiative* (2012), Invited speaker in Erwin Schrödinger International Institute for Mathematical Physics-Vienna (2007), Intel’s *first Distinguished Lecturer* in Caltech (1998) and MIT (1999). He has also given several colloquia and lectures in universities all over the world and his research was also featured in the publications *Science* (2012), *TED* (2013), *IEEE Computer* (2024), *Nature Machine Intelligence* (2022), *Nature Physics* (2022), *Nature Communications* (2024, 2025), *Proceedings of the National Academy of Sciences* (2021, 2025).