Stanford

Manu Prakash

Assistant Professor of Bioengineering

NIH Biosketch available Online Curriculum Vitae available Online

CONTACT INFORMATION

- **Alternate Contact**

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Bio

BIO

We are a curiosity driven research group working in the field of physical biology. Our approach brings together experimental and theoretical techniques from soft-condensed matter physics, fluid dynamics, theory of computation and unconventional micro and nano-fabrication to open problems in biology: from organismal to cellular and molecular scale. We design and build precision instrumentation including droplet microfluidic tools to probe and perturb biological machines and their synthetic analogues. Along the way, we invent novel technologies in global health context with clinical applications in extreme resource poor settings.

ACADEMIC APPOINTMENTS

- Assistant Professor, Bioengineering
- Member, Bio-X
- Faculty Fellow, Stanford ChEM-H
- Affiliate, Stanford Woods Institute for the Environment

ADMINISTRATIVE APPOINTMENTS

- Core Leadership Team, Stanford Center for Innovation in Global Health, (2017- present)
- Board member,, Jasper Ridge Reserve, Stanford (https://jrbp.stanford.edu), (2017- present)
- Co-Founder, Board Member, Foldscope Instruments, Inc. (www.foldscope.com), (2016- present)
- Board member, Ciencia Puerto Rico (https://www.cienciapr.org), (2017- present)
- Board Member, PIVOT (http://pivotworks.org), (2017- present)

HONORS AND AWARDS

- MIT Ideas Sustainability Prize, MIT (2003)
- Lemelson MIT Student Finalist Award, Lemelson Foundation (2008)
- Junior Fellow (Physics), Harvard Society of Fellows (2008-2011)
- Frederick E. Terman Fellow, Stanford University (2011-2013)
- TED Senior Fellow, Technology, Entertainment and Design (TED) (2011-2013)

- Pew Scholar, Pew Foundation (2013-2017)
- Brilliant 10, Popular Science Brilliant 10 (2014)
- TR35, MIT Technology Review (2014)
- Emerging Explorer, National Geographic (2015)
- MacArthur Fellow, MacArthur Foundation (2016)
- HHMI-Gates Faculty Scholar, HHMI (2016-2021)
- Chan Zuckerberg BioHub Investigator, Chan Zuckerberg BioHub (2017)
- INDEX Design Award, INDEX (2017)
- NSF “Vizzies” Experts’ Choice Award, Popular Science (2017)
- Tau Beta Pi Teaching Award, Tau Beta Pi (2017)
- WIRED’s Next List, WIRED (2017)

PROFESSIONAL EDUCATION

- Ph.D., Massachusetts Institute of Technology , Field of Study: Applied Physics (MAS) (2008)
- M.S., Massachusetts Institute of Technology , Field of Study: Applied Physics (MAS) (2004)
- B.Tech, Indian Institute of Technology , Field of Study: Computer Science and Engineering (2002)

COMMUNITY AND INTERNATIONAL WORK

- Foldscope, India
- Low-cost scanning of oral cavity, Kenya and India

LINKS

- Prakash Lab website: http://www.stanford.edu/group/prakash-lab/
- Foldscope Instruments: http://www.foldscope.com

Teaching

COURSES

2017-18

- Physical Biology of Macromolecules: BIOE 140 (Win)

2016-17

- Physical Biology of Macromolecules: BIOE 41 (Win)

2015-16

- Physical Biology: BIOHOPK 320H (Aut)
- Physical Biology of Macromolecules: BIOE 41 (Win)

2014-15

- Organismic Biophysics and Living Soft-matter: BIOE 337 (Win)
- Physical Biology of Macromolecules: BIOE 41 (Win)

STANFORD ADVISEES

Orals Chair

Donald Clarke

Postdoctoral Faculty Sponsor

Clarice Aiello, Shahaf Armon, Scott Coyle, Felix Jan Hein Hol, Arnoldus Johannes Theodorus Mathijssen, Vivek Nagendra Prakash

Doctoral Dissertation Advisor (AC)

Matthew Bull

Doctoral (Program)

Derek Croote, Alice Stanton

Postdoctoral Research Mentor

Felix Jan Hein Hol

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Bioengineering (Phd Program)
- Biophysics (Phd Program)

Publications

PUBLICATIONS

- **Vortex arrays and ciliary tangles underlie the feeding-swimming trade-off in starfish larvae** *NATURE PHYSICS*
  Gilpin, W., Prakash, V. N., Prakash, M.
  2017; 13 (4): 380-386
- **Schistosoma mansoni cercariae swim effciently by exploiting an elastohydrodynamic coupling** *NATURE PHYSICS*
  Krishnamurthy, D., Katsikis, G., Bhargava, A., Prakash, M.
  2017; 13 (3): 266-271
- **Wetting: Bumps lead the way.** *Nature materials*
  Prakash, M.
  2016; 15 (4): 378-379
- **Surface tension dominates insect flight on fluid interfaces.** *journal of experimental biology*
  Mukundarajan, H., Bardon, T. C., Kim, D. H., Prakash, M.
  2016; 219: 752-766
- **Synchronous universal droplet logic and control** *NATURE PHYSICS*
  Katsikis, G., Cybulski, J. S., Prakash, M.
  2015; 11 (7): 588-596
- **Diagnosis of Schistosoma haematobium Infection with a Mobile Phone-Mounted Foldscope and a Reversed-Lens CellScope in Ghana** *AMERICAN JOURNAL OF TROPICAL MEDICINE AND HYGIENE*
  Ephraim, R. K., Duah, E., Cybulski, J. S., Prakash, M., D'Ambrosio, M. V., Fletcher, D. A., Keiser, J., Andrews, J. R., Bogoch, I. I.
  2015; 92 (6): 1253-1256
- **Vapour-mediated sensing and motility in two-component droplets.** *Nature*
  Cira, N. J., Benusiglio, A., PRAKASH, M.
  2015; 519 (7544): 446-450
- **Vapour-mediated sensing and motility in two-component droplets** *NATURE*
  Cira, N. J., Benusiglio, A., Prakash, M.
  2015; 519 (7544): 446-?
- **Punch card programmable microfluidics.** *PloS one*
  Korir, G., Prakash, M.
  2015; 10 (3)

- **Punch card programmable microfluidics.** *PloS one*
  Korir, G., Prakash, M.
  2015; 10 (3)
- **Emergent mechanics of biological structures** *MOLECULAR BIOLOGY OF THE CELL*
  Dumont, S., Prakash, M.
  2014; 25 (22): 3461-3465
- **Emergent mechanics of biological structures.** *Molecular biology of the cell*
  Dumont, S., Prakash, M.
  2014; 25 (22): 3461-3465
- **Foldscope: Origami-Based Paper Microscope** *PLOS ONE*
  Cybulski, J. S., Clements, J., Prakash, M.
  2014; 9 (6)
- **Probing the Mechanical Coupling of the Cell Membrane to the Nucleus with Vertical Nanopillar Arrays** *57th Annual Meeting of the Biophysical-Society*
  Hanson, L., Urzay, J., Lin, Z., Zhao, W., Prakash, M., Cui, B.
  CELL PRESS.2013: 546A–546A
- **Hydraulic stress induced bubble nucleation and growth during pupal metamorphosis** *Annual Meeting of the Society-for-Integrative-and-Comparative-Biology (SICB)/Symposium on New Frontiers from Marine Snakes to Marine Ecosystems*
  Prakash, M.
  OXFORD UNIV PRESS INC.2012: E140–E140
- **Flying in two dimensions** *Annual Meeting of the Society-for-Integrative-and-Comparative-Biology (SICB)/Symposium on New Frontiers from Marine Snakes to Marine Ecosystems*
  Prakash, M., Donald, K.
  OXFORD UNIV PRESS INC.2012: E141–E141
- **The hungry fly: Hydrodynamics of feeding in the common house fly** *PHYSICS OF FLUIDS*
  Prakash, M., Steele, M.
  2011; 23 (9)
- **Face-selective electrostatic control of hydrothermal zinc oxide nanowire synthesis** *NATURE MATERIALS*
  Joo, J., Chow, B. Y., Prakash, M., Boyden, E. S., Jacobson, J. M.
  2011; 10 (8): 596-601
- **Hydraulic stress induced bubble nucleation and growth during pupal metamorphosis** *Annual Meeting of the American-Society-for-Cell-Biology (ASCB)*
  PRAKASH, M.
  AMER SOC CELL BIOLOGY.2011
- **Face-selective electrostatic control of nanowire synthesis** *Nature Materials*
  Joo, J., Chow, B., Prakash, M., Boyden, E., Jacobson, J.
  2011; 10: 596-601
- **Interfacial Propulsion by Directional Adhesion** *International Journal of Non-Linear Mechanics*
  Manu Prakash, John W. M. Bush
  2011; 46 (4): 607-615
- **On a tweezer for droplets** *Advances in Colloid and Interface Science*
  Bush, J., Peaudecerf, F., Prakash, M., Quere, D.
  2010; 161: 10-14
- **Drop propulsion in tapered tubes** *Euro Physics Letters,*
  Renvoise, P., Bush, J., Prakash, M., Quere, D.
  2009; 86: 1-5
- **Surface tension transport of prey by feeding shorebirds: The capillary ratchet** *SCIENCE*
  Prakash, M., Quere, D., Bush, J. W.

2008; 320 (5878): 931-934

- **Microfluidic bubble logic** *SCIENCE*
  Prakash, M., Gershenfeld, N.
  2007; 315 (5813): 832-835
- **The Integument of Water-walking Arthropods: Form and Function** *Advances in Insect Physiology*
  John W. M. Bush, David L. Hu, Manu Prakash
  2007; 34: 117-192
- **Water walking devices** *Experiments in Fluids*
  Hu, D., Prakash, M., Chan, B., Bush, J.
  2007; 43: 769-778
- **Microfludic Bubble Logic** *Science*
  Prakash, M., Gershenfeld, N.
  2007; 315: 832-835
- **Personal fabrication** *Telektronikk*
  Gershenfeld, N., Prakash, M.
  2004; 3: 22-26