

KRISHANU SAHA

Postdoctoral Fellow
Jaenisch Lab - Whitehead Institute
STS Fellow - Harvard University

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RESEARCH INTEREST: My technical research interest lies in probing the molecular networks involved in stem cell biology with engineering tools and exploiting them for therapeutic uses.

My social scientific and policy research interest lies in mapping patterns of social relations that form around emerging technologies, primarily around human stem cells.

EDUCATION: **Cornell University** (Ithaca, NY USA)
B.S., Chemical Engineering and Chemistry, May 2001 (Magna Cum Laude)
Minor in Materials Science and Engineering

University of Cambridge (Cambridge, United Kingdom)
M. Phil., Biotechnology (Biological Sciences), Oct. 2002 (Advisor: Electra Gizeli)

University of California at Berkeley (Berkeley, CA USA)
Ph.D., Chemical Engineering, Aug. 2007 (Advisors: David Schaffer/Kevin Healy)
Minor in Neuroscience

Whitehead Institute for Biomedical Research / M.I.T. (Cambridge, MA USA)
Postdoctoral Fellow, Sept. 2007 - current (Advisor: Rudolf Jaenisch)

Harvard University, Kennedy School of Government (Cambridge, MA USA)
Science, Technology and Society Fellow, Sept. 2009 - current (Advisor: Sheila Jasanoff)

RESEARCH POSITIONS:

2007-current Jaenisch Group, Whitehead Human Embryonic Stem Cell Facility

2009-current Science, Technology and Society Fellow, Harvard Kennedy School of Government

2002-2007 Schaffer & Healy Groups, Chemical Engineering and Materials Science Depts., U.C. Berkeley. Designed synthetic polymeric materials to control stem cell behavior.

2001-2002 Electra Gizeli Group, Institute of Biotechnology, Biological Sciences Dept., Univ. of Cambridge. Developed, modeled, and conducted experiments on acoustic biosensors.

1998-2001 Shefford Baker Group, Materials Science Dept., Cornell Univ. Investigated mechanical behavior of metal thin films.

1999 Summer Research Intern, Catalyst Research & Development Dept., Mobil Chemical, Edison, NJ. Tested polyethylene polymerization mechanisms with various catalysts.

AWARDS:

2009-2011 Society in Science: Branco Weiss Fellow

2009 Ruth L. Kirschstein Individual Postdoctoral National Research Service (F32) Award (declined)

2008 Whitehead Educational Award

2006 First Place in Science, Technology, and Engineering Policy White Paper Competition

2006 Outstanding poster presentation at Bay Area Neuroscience Gathering, San Francisco, CA

2005-2007 Graduate Research & Education in Adaptive bioTechnology (GREAT) Training Grant Recipient

2005 Graduate Student Award from Materials Research Society (Silver)

2001-2005 National Science Foundation Graduate Research Fellowship (deferred for 2002-05)

2003 Fannie and John Hertz Foundation Graduate Fellowship Finalist

2001-2002 Winston Churchill Scholarship

2001 J. William Fulbright Graduate Student Award for United Kingdom (declined)

2000 Barry F. Goldwater Scholarship

1999-2000 Undergraduate Materials Research Initiative Award from Materials Research Society

2000 BP Amoco Research Prize

1999 BP Amoco Research Prize

1998-2000 Xerox Technical Minority Scholarship

OTHER POSITIONS:

2008 Participant in the European Science & Society Summer School (E4S) - Deconstructing and Reconstructing Life: From Classification to Design

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- 2008 Steering Committee for “Institutional Landscape in Stem Cell Research: Problems & Solutions” workshop at UC Berkeley on 6th February 2008
- 2005- Member, International Society for Stem Cell Research
- 2003-2007 Member, American Institute of Chemical Engineers
- 2003-2006 Member, Materials Research Society
- 2002-2003 Member, American Chemical Society
- 2000-2001 Academic Assistant, Biological Eng. Dept., Cornell Univ. Helped edit *Biological and Bioenvironmental Heat and Mass Transfer* by A.K. Datta. Marcel Dekker, Inc., (2002).
- 2000 Process Engineering Intern, Technical Dept., ExxonMobil Refining Co. Worked at a refinery on the delayed coker process unit.

PUBLICATIONS:

- (1) Mei Y.*, **Saha K.***, Bogatyrev S., Yang J., Hook A.L., Kalcioğlu Z.I., Cho S.W., Mitalipova M., Pyzocha N., Rojas F., van Vliet K.J., Davies M.C., Alexander M.R., Langer R.S., Jaenisch R., and Anderson D.G. (in press) “Combinatorial Development of Biomaterials for Clonal Growth of Human Pluripotent Stem Cells.” *Nature Materials*. [***equal contribution**]
- (2) Hanna J., Cheng A.W., **Saha K.**, Kim J., Lengner C.J., Soldner F., Cassady J.P., Muffat J., Carey B.W., and Jaenisch R. (2010) “Human embryonic stem cells with biological and epigenetic characteristics similar to those of mouse ESCs.” *Proceedings of the National Academy of Sciences of the USA*. doi: 10.1073/pnas.1004584107.
- (3) **Saha K.** and R. Jaenisch (2009) “Technical challenges in using human induced pluripotent stem cells to model disease.” *Cell Stem Cell*. 5, 584-595.
- (4) Hanna J.*, **Saha K.***, Pando B., van Zon J., Lengner C.J., Creighton M.P., van Oudenaarden A., and Jaenisch R. (2009) “Direct cell reprogramming is a stochastic process amenable to acceleration.” *Nature*. 462, 595-601. [***equal contribution**]
- (5) Carey B.W., Markoulaki S., Hanna J., **Saha K.**, Gao Q., Mitalipova M., and Jaenisch R. (2009) “Reprogramming of murine and human somatic cells using a single polycistronic vector.” *Proceedings of the National Academy of Sciences of the U S A*. 106(1), 157-162.
- (6) Winickoff D.W.*, **Saha K.***, and Graff G.* (2009) “Opening Life Sciences Research and Development: Integrative Management of Data, IP and Ethics in Stem Cells” *Yale Journal of Health Policy, Law and Ethics*. 9(1), 52-127. [***equal contribution**]
- (7) **Saha K.**, Keung A., Irwin E.F., Li Y., Schaffer D.V. and Healy K.E. (2008) “Substrate modulus directs neural stem cell behavior.” *Biophysical Journal*. 95(9), 4426-4438.
- (8) Irwin E.F., **Saha K.**, Rosenbluth M., Gamble, L.J., Castner D.G., and Healy K.E. (2008) “Modulus-dependent macrophage adhesion and behavior.” *Journal of Biomaterial Science: Polymer Edition*. 19(10), 1363-1382.
- (9) Wall S.T., **Saha K.**, Ashton R.S., Kam K.R., Schaffer D.V. and Healy K.E. (2008) “Multivalency of Sonic hedgehog conjugated to linear polymer chains modulates protein potency.” *Bioconjugate Chemistry*. 19(4), 806–812.
- (10) **Saha K.***, Pollock J.F.*, Schaffer D.V., and K.E. Healy. (2007) “Designing synthetic materials to control stem cell phenotype.” *Current Opinion in Chemical Biology*. 11(4), 381-7. [***equal contribution**]
- (11) **Saha K.**, Irwin E.F., Kozhukh J., Healy K.E., and D.V. Schaffer (2007) “Biomimetic interfacial interpenetrating polymer networks control neural stem cell behavior.” *Journal of Biomedical Materials Research: Part A*, 81A:1.
- (12) **Saha K.** and D.V. Schaffer (2006) “Signaling dynamics in Sonic hedgehog tissue patterning.” *Development*. 133, 889-900.
- (13) **Saha K.**, Bender F., Rasmusson A., and E. Gizeli (2003) “Probing the viscoelasticity of protein layers with acoustic waveguide devices.” *Langmuir*. 19(4), 1304-1311.
- (14) **Saha K.**, Bender F., and E. Gizeli (2003) “Comparative study of IgG binding to bacterial proteins G and A: Non-equilibrium kinetic binding constant determination with the acoustic waveguide device.” *Analytical Chemistry*. 75(4), 835-842.

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- (15) Gizeli, E., Bender, F., Rasmusson A., **Saha K.**, Josse F., and R. Cernosek (2003) "Sensitivity of the acoustic waveguide biosensor to protein binding as a function of the device geometry." *Biosensors and Bioelectronics*. 18(11), 1399-406.

PATENTS:

- (1) **Saha K.**, Mei Y., Bogatyrev S.R., Anderson D.G., Jaenisch R., Langer R.S., Alexander M., Davies M., Yang J., Kastrup C.J., and Urquhart A. "Substrates and Methods for Culturing Stem Cells." *U.S. Patent Application* 61/171,175 (pending).
- (2) Healy K.E., Irwin E.F., Pollock J.F., Schaffer D.V., **Saha K.**, Li Y., and S. Wall "Controlling Stem Cell Destiny with Tunable, Semi-Interpenetrating Polymer Networks (sIPNs)." *U.S. Patent Application* 60/666,734 (pending).
- (3) Healy K.E., S. Wall, and **Saha K.** Polypeptide-Polymer Conjugates and Methods of Use Thereof" *U.S. Patent Application* 61/040,556 (pending).

ORAL PRESENTATIONS:

- (1) **Saha K.** (2010) Invited. "Induced pluripotent stem cells as a source of tissue for transplantation." Swiss Transplantation Society 2010 Congress. Interlaken, Switzerland.
- (2) **Saha K.** (2009) "Direct cell reprogramming is a stochastic process amenable to acceleration." Reprogramming Cell Fate: Basic Biology and Medical Perspectives. IFOM-IEO Campus, Milan, Italy
- (3) **Saha K.** (2009) Invited. "Constructing and deconstructing diseases in a dish." Science, Technology and Society Circle. Harvard University, Cambridge, MA.
- (4) **Saha K.**, and Winickoff D.E. (2008) "Opening Life Science Research and Development: Integrative Management of Data, IP and Ethics in Stem Cells." Seventh Annual Meeting of the Science and Democracy Network, Harvard University, Cambridge, MA.
- (5) **Saha K.**, Graff G., and Winickoff D.E. (2007) Invited. "A proposal for navigating the technical, intellectual property, and ethical domains of a complex and controversial field." Stanford Program on Stem Cells in Society Lecture Series, Palo Alto, CA.
- (6) **Saha K.**, Healy K.E., and Schaffer D.V. (2006) "Highly tunable synthetic hydrogels for neural stem cell control." Annual Meeting of American Institute of Chemical Engineers, San Fran., CA.
- (7) **Saha K.** and D.V. Schaffer (2006) "Signal dynamics in Sonic hedgehog tissue patterning." Annual Meeting of American Institute of Chemical Engineers, San Francisco, CA.
- (8) **Saha K.**, Schaffer D.V., and Healy K.E. (2006) "Tunable interfacial hydrogels for control of neural stem cell fate." American Vacuum Society 53rd International Symposium, San Francisco, CA.
- (9) **Saha K.** and D.V. Schaffer (2006) Invited. "Signal dynamics in Sonic hedgehog tissue patterning." British Society for Developmental Biology Autumn Meeting, Dundee, Scotland.
- (10) **Saha K.** and D.V. Schaffer (2006) "Biomimetic hydrogels for stem cell control." Invitrogen Internal Seminar, Carlsbad, CA.
- (11) **Saha K.**, Schaffer D.V., and Healy K.E. (2005) "Bioactive hydrogels for control of stem cell function." Materials Research Society Spring Meeting, San Francisco, CA.
- (12) **Saha K.**, Schaffer D.V., and Healy K.E. (2005) "Bioactive hydrogels for control of stem cell function." American Chemical Society Annual Meeting, San Diego, CA.
- (13) **Saha K.**, Schaffer D.V., and Healy K.E. (2004) "Bioactive hydrogels for control of stem cell function." Annual Meeting of American Institute of Chemical Engineers, Austin, TX.
- (14) **Saha K.**, Schaffer D.V., and Healy K.E. (2004) "Bioactive hydrogels for control of stem cell function." 7th World Congress of Biomaterials, Sydney, Australia.
- (15) **Saha K.** and E. Gizeli (2002) "Probing the viscoelasticity of protein layers with acoustic waveguide devices." 202nd Meeting of the Electrochemical Society, Salt Lake City, Utah.
- (16) **Saha K.** and S. Baker (2000) "Effects of adhesion and stacking fault energy on the thermomechanical behavior of thin copper films passivated with metal nitrides." Cornell Undergrad. Research Board Forum.

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POSTER PRESENTATIONS:

- (1) **Saha K.**, Hanna J., Pando B., van Oudenaarden A., and Jaenisch R. (2010) "Quantitative models and landscapes of reprogramming somatic cells to pluripotency." International Society for Stem Cell Research Annual Meeting, San Francisco, CA.
- (2) **Saha K.**, Hanna J., Pando B., van Zon J., Lengner C., Creighton M., van Oudenaarden A., and Jaenisch R. (2010) "Distinct modes of accelerating the stochastic process of direct reprogramming." Keystone Symposia, Keystone, CO.
- (3) **Saha K.**, Mei Y., Bogatyrev S.R., Yang J., Kalcioğlu Z.I., Cho S.W., Mitalipova M., Pyzocha N., van Vliet K., Davies M.C., Alexander M.R., Langer R., Anderson D.G., Jaenisch R. (2009) " High Throughput Development of Biomaterials for Clonal Growth of Human Embryonic Stem Cells." International Society for Stem Cell Research Annual Meeting, Barcelona, Spain.
- (4) **Saha K.**, Graff G., and Winickoff D.E. (2008) "An Interdisciplinary Public Consortium for Stem Cell Research." Stem Cell Summit, Boston, MA. *This poster has also been presented by my coauthors at other venues: 2008 Association of University Technology Managers Annual Meeting, San Diego, CA, and 2008 Gordon Research Conference on Science and Technology Policy, Big Sky, MT.*
- (5) **Saha K.**, Miller L., Schaffer D.V., and Healy K.E. (2006) "Synthetic hydrogels for stem cell control." International Society for Stem Cell Research Annual Meeting, Toronto, Canada.
- (6) **Saha K.**, Miller L., Schaffer D.V., and Healy K.E. (2006) " Synthetic hydrogels for stem cell control." U.C. Berkeley Stem Cell Retreat, Asilomar, CA.
- (7) **Saha K.**, Irwin E.F., Kozhukh J., Healy K.E., and Schaffer D.V. (2006) "Synthetic hydrogels for neural stem cell control." Bay Area Neuroscience Gathering, San Francisco, CA.
- (8) **Saha K.**, Irwin E.F., Kozhukh J., Healy K.E., and Schaffer D.V. (2005) "Synthetic hydrogels for stem cell control." Biocompatibility Gordon Research Conference, New Hampshire.
- (9) **Saha K.** and E. Gizeli (2002) "Probing the viscoelasticity of biological layers with acoustic waveguide devices." Seventh World Congress of Biosensors - Biosensors 2002, Kyoto, Japan.
- (10) **Saha K.**, Shu J., and Baker S. (2001) "Interfacial control of plasticity in silver thin films." Sixth International Workshop on Stress-Induced Phenomena in Metallizations, Ithaca, NY.

TEACHING EXPERIENCE / OUTREACH:

2008-2010	Whitehead Partner in Whitehead's Partnership for Science Education program
2005	Graduate Student Instructor, ChemE. Mass Transfer & Separations Course, U.C. Berkeley
2004	Graduate Student Instructor, ChemE. Reactor Kinetics Course, U.C. Berkeley
2002-2003	Bear Trax: Youth tennis coach
2002-2003	Foreign Student Conversation Partner, UC Berkeley International House
2000-2001	Encourage Youth Educate Society (EYES) Team Leader / Coordinator
2000	Youth basketball coach