

SOHAM GHOSH, PhD

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EDUCATION

Post Doc, August 2015 – July 2018, University of Colorado Boulder, Advisor: Corey P Neu

Post Doc, Jan 2015 – July 2015, Biomedical Engineering, Purdue University, Advisor: Corey P Neu

Ph.D., December 2014, Mechanical Engineering, Purdue University, Advisor: Bumsoo Han

M Tech, Mechanical Engineering, 2010, Indian Institute of Technology Madras

BE, Mechanical Engineering, 2008, Jadavpur University, India

RESEARCH INTEREST AND EXPERTISE

Subcellular and nuclear mechanics; Mechanobiology of nucleus, epigenetic modification and chromatin remodeling; Innate cellular response to stress; Image based mechanics; Role of mechanobiology in degenerative conditions; Cellular engineering; Specific clinical application area: musculoskeletal tissues

PUBLICATIONS

Book chapter

Soham Ghosh, Seungman Park, Bumsoo Han, 2016, Chapter Title: Freezing-induced changes of extracellular matrix and functional properties of engineered tissues, Book Title: Multiscale Technologies for Cryomedicine - Implementation from the nano to the macroscale, Edited by Xiaoming He and John C Bischof, World Scientific/Imperial College London Press

Journal submissions under review, published as preprint

Soham Ghosh, Victor Crespo Cuevas, Benjamin Seelbinder, Corey P Neu, 2020, Image-based elastography of heterochromatin and euchromatin domains in the deforming cell nucleus, *bioRxiv* (Under review in *ACS Nano*)

Benjamin Seelbinder, **Soham Ghosh**, Alycia G. Berman, Stephanie E. Schneider, Craig J. Goergen, Sarah Calve, Corey P. Neu, 2019, Intra-nuclear tensile strain mediates reorganization of epigenetically marked chromatin during cardiac development and disease, *bioRxiv* (First round review completed in *Nature Biomedical Engineering*, Revision is in preparation)

Peer-reviewed journal publications

Soham Ghosh, Benjamin Seelbinder, Jonathan T Henderson, Ryan D Watts, Adrienne K Scott, Alexander I Veress, Corey P Neu, 2019, Deformation microscopy for dynamic intracellular and intranuclear mapping of mechanics with high spatiotemporal resolution, *Cell Reports*, 27 (Highlighted by NSF, EurekAlert, ScienceDaily, PhysOrg etc)

Soham Ghosh, Evan Phillips, James Cimino, Adrienne K Scott, Frederick Damen, Alexander I Veress, Craig J Goergen, Corey P Neu, 2017, “*In vivo* multiscale and spatially dependent biomechanics reveals differential strain transfer hierarchy in skeletal muscle” *ACS Biomaterials Science & Engineering*, 3

Soham Ghosh, Altug Ozcelikkale, J. Craig Dutton, Bumsoo Han, 2016, “Role of intracellular poroelasticity on freezing-induced deformation of cells in engineered tissues” *Journal of the Royal Society Interface*, 13

Soham Ghosh, Guoping Xiong, Timothy Fisher, Bumsoo Han, 2016, “Guidance of cell adhesion and migration by graphitic nanopetals on carbon fibers” *Materials Letters*, 184

Soham Ghosh, J. Craig Dutton, Bumsoo Han, 2014, “Measurement of spatiotemporal intracellular deformation of cells adhered to collagen matrix during freezing of biomaterials” *Journal of Biomechanical Engineering-Transactions of the ASME*, 136 (2), 021025 (Published in the 2014 annual special issue, nominated 2014 Editors’ choice selection as top 9 out of 187)

Soham Ghosh, Nilamani Sahoo, Panikkanvalappil R. Sajanlal, Nirod Kumar Sarangi, Nivarthi Ramesh, Tapobrata Panda, Thalappil Pradeep, Sarit Kumar Das, 2014, “Anomalous subsurface thermal behavior in tissue mimics upon NIR irradiation mediated photothermal therapy” *Journal of Biomedical Nanotechnology*, 10(3)

Nilamani Sahoo, **Soham Ghosh**, Arunn Narasimhan, Sarit K Das, 2014, “Investigation of non-Fourier effects in bio-tissues during laser assisted photothermal therapy” *International Journal of Thermal Sciences*, 76

Bumsoo Han, Ka Yaw Teo, **Soham Ghosh**, J. Craig Dutton, Frederick Grinnell, 2013, “Thermomechanical analysis of freezing-induced cell-fluid-matrix interactions in engineered tissues” *Journal of the Mechanical Behavior of Biomedical Materials*, 18

Soham Ghosh, Debabrata Dasgupta, Suman Chakraborty, Sarit K Das, 2013, “Superparamagnetic nanoparticle assisted hyperthermia and cooling protocol for optimum damage of internal carcinoma using computational predictive model” *Heat Mass Transfer*, 49(9)

Altug Ozcelikkale, **Soham Ghosh**, Bumsoo Han, 2013, “Multifaceted transport characteristics of nanomedicine: needs for characterization in dynamic environment” *ACS Molecular Pharmaceutics*, 10

Soham Ghosh, Willard Hanson, Najma Abdollahzadeh and Bumsoo Han, 2012, “Effects of light-tissue interaction on quantum dot mediated fluorescence thermometry” *Measurement Science and Technology*, 23 (4), 045704 (Also selected for a special collection, the highlights of 2011-2012, and its cover image. This selection includes the best articles published in MST chosen by Editorial Board)

Soham Ghosh, Tamal Das, Suman Chakraborty, Sarit K Das, 2011, “Predicting DNA-mediated drug delivery in interior carcinoma using electromagnetically excited nanoparticles” *Computers in Biology and Medicine*, 41(9)

Debabrata Dasgupta, Geoffrey von Maltzahn, **Soham Ghosh**, Sangeeta N Bhatia, Sarit K Das, Suman Chakraborty, 2009, “Probing nanoantenna-directed photothermal destruction of tumors using noninvasive laser irradiation” *Applied Physics Letters*, 95(23), 233701 (Appeared in *Virtual Journal of Laser*, Appeared in *virtual journal of Nanoscale Science and Technology*)

Selected conference proceedings articles and presentations

Soham Ghosh, Adrienne K Scott, Jessica Kelly, Benjamin Seelbinder, Xin Xu, Stephanie E Schneider, Corey P Neu, In vivo Lamin A/C deficiency maintains bulk nucleus shape and stiffness, but leads to abrogated intranuclear mechanics and chromatin organization, Summer Biomechanics, Bioengineering and Biotransport Conference 2019, Seven Springs, USA

Soham Ghosh, Adrienne K Scott, Jessica Kelly, Xin Xu, Benjamin Seelbinder, Stephanie E Schneider, Corey P Neu, Lamin A/C deficient mice reveal normal nuclear shape in vivo, but abrogated chromatin organization and intranuclear mechanics, Biomedical Engineering Society Annual Meeting 2018, Atlanta, USA

Soham Ghosh, Benjamin Seelbinder, Victor Crespo Cuevas, Corey P Neu, Image texture-based elastography of the intranuclear space, ASME NanoEngineering for Medicine and Biology Conference 2018, Los Angeles, USA

Soham Ghosh, Adrienne K Scott, Jeanne E Barthold, Benjamin Seelbinder, Brittany M St. Martin, Stephanie E Schneider, Jonathan T Henderson, Alexander I Veress, Corey P Neu, Cell geometry and nuclear envelope integrity regulates chondrocyte dedifferentiation in monolayer culture, World Congress of Biomechanics 2018, Dublin, Ireland

Soham Ghosh, Dominik R Haudenschild, Sarah Calve, Corey P Neu, 2017 “Deep imaging of traditional histological staining in cartilage tissue using optical clearing and confocal microscopy” Orthopaedic Research Society Meeting 2017, San Diego, CA, USA

Soham Ghosh, James Cimino, Adrienne Scott, Frederick Damen, Evan Phillips, Craig Goergen, Corey P Neu, 2017 “In vivo quantification of multiscale mechanics in murine skeletal muscle tissue, extracellular matrix, and nuclei” Orthopaedic Research Society Meeting 2017, San Diego, CA, USA

Soham Ghosh, Adrienne Scott, Benjamin Seelbinder, Brittany M St Martin, Jeanne E Barthold, Jonathan Henderson, Alexander Veress, Corey P Neu, 2017 “Cell geometry and mechanics modulate chondrocyte chromatin organization” Orthopaedic Research Society Meeting 2017, San Diego, CA, USA

Soham Ghosh, Guoping Xiong, Timothy Fisher, Bumsoo Han, 2016 “Cells interact with graphene nanopetals coated on carbon fibers” ASME NanoEngineering for Medicine and Biology Conference 2016, Houston, TX, USA

Soham Ghosh, J. Craig Dutton, Bumsoo Han, 2013 “Spatiotemporal intracellular deformation of cells during freezing-induced cell fluid matrix interactions” ASME Summer Bioengineering Conference 2013, Sunriver, Oregon, USA (*selected for Ph.D. paper competition, awarded ‘Finalist certificate’*)

PROFESSIONAL ACTIVITIES

- **Workshop organizer:** Summer Biomechanics Bioengineering and Biotransport Conference 2020 (now postponed to 2021). “The Elephant in the Cell: Nuclear Mechanics and Mechanobiology”
- **Co-chair, session:** Biomedical Engineering Society Annual Meeting 2019, Philadelphia, USA
- **Co-chair, session:** ASME NanoEngineering for Medicine and Biology Conference 2018, Los Angeles, USA

- Active member, American Society of Mechanical Engineers Bioengineering Division (ASME-BED), Biomedical Engineering Society (BMES), Orthopaedic Research Society (ORS)
 - Reviewer of journals (*selected, ad hoc*): Journal of the Royal Society Interface, Tissue Engineering - Part A, Journal of Biomechanical Engineering-Transactions of the ASME
 - Reviewer of conference (*ad hoc*): Summer Biomechanics Bioengineering and Biotransport Conference
 - Judge of PhD Student Paper Competition: Summer Biomechanics Bioengineering and Biotransport Conference
 - Reviewer (*ad hoc* by email) for Israel Science Foundation – Singapore National Research Foundation joint grant on mechanobiology
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INVITED TALK

Soham Ghosh, “Image based biomechanics”, University of Colorado Boulder, April 2018 (invited lecture)

Soham Ghosh, “Biomechanics of soft tissues: single cells and beyond”, University of Notre Dame, February 2018

Soham Ghosh, “Biomechanics of soft tissues: single cells and beyond”, Colorado State University, December 2017

Soham Ghosh, “Multiscale spatiotemporal mechanobiology: applications in physiology, diseases, and engineering of single cells and tissues”, University of Miami, Coral Gables, May 2017

Soham Ghosh, “Multiscale mechanobiology: deformation, flow and force in single cell and beyond”, University of Nebraska, Lincoln, February 2016

Soham Ghosh, “Multiscale mechanobiology: deformation, flow and force in single cell and beyond”, University of Oklahoma, Norman, February 2016

Soham Ghosh, “Hierarchical cell-fluid-extracellular matrix interaction in biomaterials during freezing”, School of Public Health, Harvard University, August 2014

Soham Ghosh, “Peer pressure in cell: Competition between stiffness and hydraulic conductivity”, Mechanics of Materials seminar series, Purdue University, September 2014

TEACHING AND MENTORING ACTIVITIES

2018 onward, at Colorado State University

MECH 262: Engineering Mechanics (Spring)

BIOM 441: Biomechanics and Biomaterials (Fall)

MECH/ BIOM 5XX: Regenerative Bioengineering with Stem Cells (Starting Spring 2021)

PhD student mentoring: Samantha Kaonis, Neda Kabi

Undergraduate student mentoring: Skyler Hochmuth, Greta Gohring