

The Department of Mechanical Engineering Presents

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Title: The Force Awakens: Interfacial Transport and Mechanics in Soft Biomaterials

Abstract: Soft biomaterials are critically important in numerous applications, including healthcare, food, pharmaceutical, and cosmetic products. Recent advances in polymer sciences enable a wide variety of novel hydrogels for new emerging applications, including tissue engineering, controlled drug delivery, smart sensors, stretchable and wearable electronics, and energy storage and conversion devices. However, it is still extremely challenging to design and engineer functional products and manufacturing processes of these soft materials. This is largely due to a limited understanding of interfacial transport and mechanics in soft materials. Moreover, the significance of transport and mechanics begins to be recognized in disease development and progression, so-called “mechanobiology.” In this talk, I will present my group’s research to understand and manipulate the transport and interfacial interactions in soft biomaterials. These include the development of microfluidic tumor models for drug discovery and screening for anti-cancer drugs, measurement of injection-induced pain of biologics, and 3D printing of hydrogels.

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About the Speaker: Bumsoo Han is a Professor of Mechanical Engineering and Biomedical Engineering at Purdue University. He is also a Program Leader of Drug Delivery and Molecular Sensing Program of NCI-designated Purdue Center for Cancer Research. He is B.S.F. Schaefer Outstanding Young Faculty Scholar and Discovery Park Fellow at Birck Nanotechnology Center. He received his Ph.D. in Mechanical Engineering from the University of Minnesota, and his M.S. and B.S. from Seoul National University in Korea. After his Ph.D., he was a Post-doctoral Research Associate in Mechanical and Biomedical Engineering at the University of Minnesota. His broad research interests are in biotransport phenomena. Current research efforts are focused on the transport of drugs and particles at the tumor microenvironment, disease-on-chip models, and cell-fluid-matrix interaction in stromal tissues. His group has been developing several quantitative optical diagnostics techniques to measure transport and cell-matrix interactions at the cellular microenvironment. He received US DOD Postdoctoral Award for Breast Cancer Research, NSF CAREER Award, Faculty Fellowship from U.S. Air Force Research Laboratory (Predictive Toxicology Program), and Richard Skalak Best Paper Award from ASME Journal of Biomechanical Engineering. He is a recipient of the Faculty of Excellence Early Career Research Award from Purdue University and Brain Pool Korea Fellowship from the Ministry of Science of South Korea. He also receives the Discovery Award in Mechanical Engineering at Purdue University. He is a Fellow of ASME.

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