

Mechanical & Aerospace Engineering Colloquium Series Spring 2018 Program

Wednesday, February 28, 2018
3:30 – 4:30 p.m. (refreshments/social hour at 4:30)
Easton Hub Auditorium (in the Fiber Optics Building)

Co-Sponsored with Biomedical Engineering

Electrotransfection for Gene Delivery

Professor Fan Yuan

Duke University

Abstract: Electric pulses can mediate gene delivery into cells. The technique is called electrotransfection or electroporation in the literature. Compared to viral delivery systems, electrotransfection is safe, easy to use, and unlimited by the size and the number of genes to be delivered simultaneously into a cell. To improve the efficiency of this non-viral method for gene delivery, we have investigated mechanisms by which DNA enters cells and travels from the surface to the nucleus. Results from our studies show that pulsed electrical field stimulates endocytosis, and that intra-cellular transport relies on specific vesicles involved in multiple pathways of endocytosis and autophagy. These findings are being used to develop new strategies for improving the efficiency of electrotransfection.

Bio: Fan Yuan is currently a Professor of Biomedical Engineering and Ophthalmology at Duke University, Durham, North Carolina, USA. He studied at Peking University between 1979 and 1985, where he received B.S. and M.S. degrees in mechanics. In 1986, he went to the City University of New York, and received a bioengineering Ph.D. degree in 1990. After graduation, he had a post-doctoral training in biomedical engineering for one year at Carnegie Mellon University, and moved to Harvard Medical School in 1991, where he worked initially as an Instructor and later was promoted to Assistant Professor of Radiation Oncology. In 1996, he was recruited by the Duke University, and has been working there since then. He had served as the Director of Undergraduate Studies for three years, and is currently the Director of Graduate Studies for Master Programs in the Department of Biomedical Engineering. His research interests include biomechanics, transport analysis in cell and tissues, and drug and gene delivery in the eye and solid tumors. He has received several awards, including IPM Innovative Instrumentation Award from Microcirculatory Society and CAREER Award from National Science Foundation. He is a Fellow of the American Institute for Medical and Biological Engineering and the Biomedical Engineering Society. He has published more than 100 research papers and book chapters, and co-authored one textbook on transport analysis in biological systems.

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