

**Fall Seminar Series
Department of Electrical and Computer Engineering
Wednesday, November 10, 2021
Noon – 1:00 PM EST**

Zoom Video Conference: <https://temple.zoom.us/j/91405879118>

Engineering-based oral health research

Professor Geelsu Hwang, University of Pennsylvania

Abstract: Biofilms are surface-attached aggregates of microorganisms typically consisting of multiple species that are frequently embedded within a three-dimensional matrix of extracellular polymeric substances. In particular, biofilms are involved in approximately 80% of all microbial infections in the human body. Furthermore, a sharp increase in using medical implants and devices has led to the development of a new class of microbially induced infectious diseases due to the rapid bacterial accumulation on material surfaces. Once biofilms are established, it becomes extremely difficult to kill bacteria or mechanically remove biofilms from solid surfaces. Thus, new approaches are needed to effectively prevent bacterial attachment on the surface or target the biofilm structure, kill the bacterial cells embedded within, and remove the degraded products. To address this problem, we have made significant advances towards developing novel therapeutic approaches including catalytic antimicrobial robots and Smart Dental Implant system. Application of a variety of engineering concepts and methods to further advance the knowledge about the pathogenesis of biofilm-derived oral diseases and to devise new and effective therapeutic approaches will be discussed.

BIOGRAPHY: Dr. Geelsu Hwang is an assistant professor in the Department of Preventive and Restorative Sciences at the University of Pennsylvania School of Dental Medicine. Dr. Hwang has a unique career in the field of biofilm research. He has a strong background in chemical, biomolecular, and environmental engineering. His research interest has focused on applying engineering principles and tools to understand the pathogenesis of microbially-induced infectious diseases and developing novel therapeutic strategies. He has published extensively in the area of biofilm research by integrating engineering, biological, biochemical, and imaging methodologies. He has received two NIH-supported grants, and three awards from University of Pennsylvania. He is establishing a unique research career in dental and oral biofilm research as an engineer.