

DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

WILLIAM MAXWELL REED SEMINAR SERIES

“Space Biology: Microgravity Effects on Biofilms and Potential Strategies to Control Biofilm Growth in Space”

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Abstract:

Microgravity is a unique environment that can induce changes in growth dynamics, virulence, and resistance to antibiotics of microorganisms. Microorganisms' natural ability to live as organized multicellular communities – also known as biofilms – provides them with unique survival advantages. For instance, bacterial biofilms are protected against environmental stresses thanks to their extracellular matrix, which could contribute to persistent infections after treatment with antibiotics. Bacterial biofilms are also capable of strongly attaching to surfaces, where their metabolism byproducts could lead to surface material degradation. The presence of biofilms in space represents a risk for both astronauts and spaceflight hardware. Despite the efforts to eliminate microorganism contamination from spacecrafts surfaces, it is impossible to prevent human-associated bacteria from eventually establishing biofilm surface colonization. Nevertheless, by understanding the changes that biofilms undergo in microgravity, it is possible to identify key differences and pathways that could be targeted to significantly reduce biofilm formation. The Space Biofilms project, performed at the International Space Station, contributes to such understanding by characterizing the morphology and gene expression of bacterial and fungal biofilms formed in microgravity with respect to ground controls. Different material surfaces were tested as potential biofilm control strategies. This material is supported by the National Aeronautics and Space Administration under Grants No. 80NSSC17K0036 and 80NSSC21K1950.

Speaker Bio:



Pamela Flores obtained a Ph.D. in Molecular, Cellular and Developmental Biology at the University of Colorado Boulder (2022) and a B.S. in Biochemistry and Microbiology from Universidad del Valle de Guatemala (UVG, 2017). She worked at the Center for Biotechnology Studies (CEB-UVG) and at the Centers for Disease Control and Prevention (CDC, Atlanta, GA), silencing mosquito genes to control Malaria transmission in rural areas. She worked with biologically compatible nanoparticles to induce transient gene expression inhibition at Institut des Sciences Moléculaires d'Orsay (ISMO, Paris, France). She was part of mission #264 at the Mars Desert Research Station (MDRS) focusing on first aid for medical emergencies in extreme environments. She has done internships at NASA GeneLab for the rodent research team and at University of Kentucky in the Dutch virology laboratory. Currently, she is the Co—I of the NASA-funded Space Biofilms project that aims to characterize changes of bacterial and fungal biofilms in microgravity. Her research interests are in space microbiology, stem cells, and biotechnology with medical applications.

Date: Friday, September 1, 2023
Place: Whitehall Classroom Building 110

Time: 3:00 PM EST
Contact: Dr. Jonathan Wenk

Attendance open to all interested persons