Northeastern University
College of Engineering

Wednesday, November 6, 2024 | 305 Shillman Hall | 12:00 PM

Distinguished Seminar Speaker

Molecular Engineering for Production of Anti-cancer Compounds in Plant Cell Culture

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Abstract: Our research is focused on cellular engineering and design of bioprocesses using plant-based systems. Plants produce sophisticated small molecules that play key roles in defense against predators and environmental elements. These natural products are synthesized through specialized metabolic pathways, that have both shared and unique components when compared amongst plant systems. These specialized metabolites are useful in a variety of societal applications including as nutraceuticals, flavorings, colorings and pharmaceuticals. The supply of these compounds is often hindered due to low yields in nature and the inability to chemically synthesize at scale. We use plant cell culture technology as both a system of study and a scalable production system due to the ability to engineer cells and the environment to optimize accumulation of products of interest. Our group uses a combination of traditional bioprocess engineering techniques (e.g., bioreactor design, cell culture, media optimization) and modern molecular biology and analytical chemistry techniques (e.g., gene transfer, transcriptomics analyses, UPLC). Today, I will focus my talk on molecular engineering strategies to understand and increase paclitaxel production in *Taxus* plant cell suspension culture. We have applied transcriptomics analyses and genetic engineering tools to understand and manipulate the pathway to paclitaxel, identify paclitaxel transporters, and engineer epigenetic mechanisms that can lead to decreased production over time in culture.

Biography: Dr. Susan Roberts is Professor and Head of Chemical Engineering at WPI. She received her BS degree in Chemical Engineering from WPI in 1992, PhD in Chemical Engineering from Cornell University in 1998, served on the faculty at UMass Amherst Chemical Engineering for 17 years and joined WPI as Professor and Head in 2015. Her work has raised over $10M from NSF, NIH, industry and government. She is a program builder and has established new interdisciplinary research and education programs through strategic partnerships and external funding from the NSF ADVANCE Program, NIIMBL Workforce Development Award, Mass Life Sciences Center, NSF IGERT and NIH T32 Programs. She is a passionate about faculty development, training interdisciplinary engineers, innovating graduate education and advocating for advancement of women and underrepresented groups in STEM fields.

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