Thursday, September 27, 2018
11:00-11:30 a.m.

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Microbial production of modified plant alkaloids

Plant alkaloids have a wide range of therapeutic applications, from uses as anticancers and antipsychotic agents to analgesics and antimalarials. Despite their widespread therapeutic use, alkaloids are underrepresented among pharmaceuticals. Factors contributing to the scarcity of alkaloid-based pharmaceuticals include low-level accumulation of key alkaloids in native plants and their difficult isolation from a sea of structurally similar metabolites. Recent work engineering microbes for the production of plant alkaloids offers a promising solution to their limited availability. Although most work to date has focused on engineering microbes for the production of the exact plant alkaloid natural products, in some instances it may be of more economic and therapeutic value to engineer microbes to produce modified plant alkaloids. Modified alkaloids carrying chemical handles at key positions could accelerate the synthesis of known pharmaceuticals by enabling access to late synthetic intermediates or open the door to new synthetic routes to novel therapeutics. Here, I will present work on the engineering of yeast for the production of modified monoterpene indole alkaloids. I will discuss the scientific challenges of engineering microbes for plant natural products and I will highlight modified alkaloids that could be produced in microbes using the current synthetic biology state of the art.

Biography:
Pamela Peralta-Yahya graduated from Macalester College in 2003 with a double major in Chemistry and Biology. She earned her Ph.D. with Prof. Virginia Cornish at Columbia University and was a postdoctoral researcher under the advice of Prof. Jay Keasling at the University of California, Berkeley/ Joint BioEnergy Institute. Pamela is currently an assistant professor in the School of Chemistry and Biochemistry at the Georgia Institute of Technology. Her group works at the interphase of biochemistry and engineering and focuses on two research areas: the engineering of G-protein coupled receptor (GPCR)-based chemical sensors for biotechnology and biomedical applications, and the microbial synthesis of chemically modified plant alkaloids to accelerate the synthesis of pharmaceuticals. She has won several awards including the DARPA Young Faculty Award, the DuPont Young Professor Award, Kavli Fellowship and more recently the NIH MIRA Award.