"CELLULAR RESOURCE USE MINIMIZATION: THE ENGINEERING OF A BACTERIAL CHASSIS"

Dr. José Utrilla Carreri

UNAM- Centro de Ciencias Genómicas, México

utrilla@ccg.unam.mx

Wild type bacteria deploy cellular resources for growth and survival under changing environments. The expression of these unused functions drains resources that may be used for growth or the expression of a biotechnological function such as the production of a heterologous protein or an engineered metabolic pathway. Suboptimal resource allocation for growth or engineered biotechnological functions has been documented elsewhere. In this talk we will present our engineering strategies to reduce the allocation of cellular resources for unused functions such as readiness to environmental change. We make use of regulatory networks, proteomic data and genome scale models to build a computational tool to predict necessary genetic interventions that will reduce the proteomic budget allocated for those unused functions. Also, we employ coarse-grained models design the engineering targets of the translational machinery allocation. We experimentally evaluate our designed phenotypes with fluorescent reporter genetic circuits and a proof of concept heterologous metabolic pathway. Our results show that it is possible to minimize the use of cellular resources for unused functions and increase the performance of a bacterial chassis in biotechnological and synthetic biology applications.