

PRECISE: A PREcision genomics Core to advance Innovative Systems bioEngineering**Lead contact:**

Name: Dr. Libo Shan, Institute for Plant Genomics and Biotechnology, TAMU AgriLife

Department: Plant Pathology & Microbiology, COALS

Phone number: 979-845-8818

Email: lshan@tamu.edu

Key Participating Units: College of Agriculture & Life Sciences (COALS) | AgriLife | College of Engineering (COE) | Texas A&M Engineering Experiment Station (TEES) | Texas A&M Health Science Center (TAMHSC) | College of Medicine (COM) | College of Veterinary Medicine (CVM) | College of Science (COS)

Key Team Members or Co-Investigators:

Dr. Aniruddha Datta: Center for Bioinformatics and Genomic Systems Engineering, COE/TEES

Dr. Paul de Figueiredo: Microbial Pathogenesis and Immunology, TAMHSC/COM; Department of Veterinary Pathobiology, CVM

Dr. Ping He: Biochemistry and Biophysics, COALS/AgriLife

Dr. Charlie Johnson: Director, Texas A&M AgriLife Genomics and Bioinformatics Service, AgriLife

Dr. PaoTai Lin: Electrical and Computer Engineering/Materials Science & Engineering, COE/TEES

Dr. Michael Thomson: Crop Genome Editing Laboratory, COALS/AgriLife

Total Amount Requested: ~\$2,402,318

Executive summary: PRECISE will establish a state-of-the-art research cooperative, providing specialized biotechnology research, training and services to augment the existing precision biosciences and bioanalysis resources on campus. PRECISE centers on a systems-level approach to biotechnology by aiming to *unify the identification of genomic targets, precision genome editing, translational genomics, and bioprocess analysis into one highly tailored and collaborative pipeline*. Since the land-mark discovery of CRISPR-based genome editing in 2012, precision biosciences along with molecular genomics and bioprocess analysis offer revolutionary opportunities to transform the fields of medicine, agriculture, and microbiology. As numerous individual investigators on campus are engaged in studies that require the use of precision biosciences and high throughput bioprocess analysis, there is a pressing need for a collaborative core facility with specialized instrumentation and research expertise that will catalyze these independent efforts and serve as a focal point to increase the visibility and success of our institution. Thus, with the goal for TAMU researchers to capture unprecedented opportunities in precision biosciences, PRECISE is designed to provide the tools and platforms necessary to advance genome editing, and bioprocess analysis, as well as a team of specialists who can act as a knowledge-base and training resource.

With the requested RDF support, PRECISE will focus on 1) *translational genomics with precision genome editing and contemporary plant and mammalian transformation services*, together with cutting-edge genomics technologies to identify and monitor the genetic diversity of genomic targets. 2) *Integrated mid-infrared (mid-IR) photonic systems to enable real-time and label-free biphotonic-based phenotyping of plant and animal cells*, which promises to revolutionize bioengineering research and the biotechnology industry. PRECISE will provide industry-standard equipment to meet the scale of work and project-specific challenges presented by TAMU researchers. As evidence of the need for PRECISE, COALS/AgriLife created a pipeline to facilitate crop gene-editing and multi-crop transformation in 2018. The team that supports this pipeline has already secured initial seed grant investments and X-grant support. This investment was critical to attract and retain some of the assembled personnel that support this RDF project. However, this initial investment was insufficient to properly equip these personnel with the instrumentation required to fully serve faculty requests, as well as manage requests for precision engineering of mammalian cell systems. Supporting PRECISE to advance this vision would propel TAMU research in precision biosciences and bioprocess analysis into a nationally competitive echelon and broadly increase our success in acquiring federal and multi-investigator grants, ultimately providing a strong return on investment.