

1. **Research Title:** Synthetic Biology for Materials Through Protein and Organism Engineering
2. **Individual Sponsor:**

Dr. Chia-Suei Hung, AFRL/RXAS
AFRL/RXAS Bldg 654, Rm 345
2941 Hobson Way
WPAFB, OH 45433-7333
chia-suei.hung.2@us.af.mil

3. **Academic Area/Field and Education Level**

Synthetic Biology/Molecular Biology/Microbiology/Protein Engineering/
Biomaterials/Metabolic Engineering (Master and PhD level)

4. **Objectives:** This research project aims to develop tools and systems via synthetic biology for bio-based material synthesis.
5. **Description:** Using the Design-Build-Test-Learn paradigm, synthetic biology has harnessed and combined the power of molecular biology, metabolic engineering, and system biology into a powerful pipeline for modern biotechnology. Taking advantage of this emerging field, synthetic biology presents a powerful tool for novel material synthesis for the US Air Force. Our research aims to address the mission of AFRL to develop materials that could benefit our Airmen. We are exploring many different disciplines, including but not limited to molecular cloning, protein engineering, organism engineering, metabolic pathway engineering, and gene regulation to achieve our goals. Also we are adapting protein engineering and modifying proteins/enzymes from orthogonal systems for materials synthesis and critical minerals acquisition. Furthermore, we would like to expand beyond the usage of modeled organisms and gain a deep understanding of the synthetic biology engineering pipeline and push the boundary for bio-based material productions.
6. **Research Classification/Restrictions:** This research is non-classified and has no restriction.
7. **Eligible Research Institutions:** All Ohio research universities that offer Master's or doctoral level graduate schools, including University of Dayton, Wright State University, The Ohio State University, University of Cincinnati, University of Akron, Case Western Reserve University, and Miami University.

NOTE: Topics submitted to DAGSI must be approved for public release. Need PA Approval #