

REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHB-21-02

FUNCTIONALIZED NUCLEIC ACIDS NANOSTRUCTURES FOR AIRMAN AUGMENTATION

PROJECT DESCRIPTION: The programmability of Nucleic acids (NAs) at different length scales, the availability of computational tools to optimize the design of complex NA structures and the ability to engineer these structures with functional moieties provide a platform to develop entities that can be programmed to navigate the bloodstream and monitor biomarker signatures in an unsupervised way. Research objectives: 1. Identify design rules for robust NA structures maintaining the functionality of biomarker-responsive sensing elements, 2. Optimize the navigation capabilities of these nanostructures to avoid clearance and extend their lifetime, 3. Incorporate different performance enhancing cocktails to be released when specific biomarker signatures are detected.

ACADEMIC LEVEL: Bachelors, Masters, PhD

DISCIPLINE NEEDED:

- Life Health and Medical Sciences
 - Biochemistry
 - Biophysics
 - Cellular and Molecular Biology
- Nanotechnology
 - Nanotechnology

PREFERRED QUALIFICATIONS:

- Masters or PhD student in the field of nanotechnology and/or biological sciences with interest in nanotechnology.
- Experience with biology wet lab techniques or nanomaterials synthesis and characterization would be ideal.
- This projects aims to integrate both fields and the team has experts in both areas. The selectee can be trained in the area of research the candidate is less familiar with.

RESEARCH LOCATION: Wright-Patterson AFB Dayton, OH

RESEARCH ADVISER: Jorge Chavez, PhD
Chemistry/Nanomaterials, University of Florida, 2008

Dr. Jorge Chavez obtained a B.Sc. in Chemistry from the Pontificia Universidad Catolica del Peru, where he performed research in polymer chemistry, and a Ph.D. in Chemistry from the University of Florida, working in the synthesis and characterization of nanomaterials. He continued his career as an ORISE postdoctoral researcher at the Air Force Research Laboratory in Dayton, OH. Dr. Chavez is currently the Molecular Sensing and Physiology Core Research Area Technical Advisor in the Human Systems Directorate in AFRL, and a Principal Investigator leading a group working at the interface of synthetic biology and nanotechnology developing sensing capabilities to monitor different non-medical conditions that affect human performance.