Attachment 1 – DAGSI Research Topic Template

1. **Research Title:** Nanostructures for In-body Sensing Health and Performance Sensing and Augmentation
2. **Individual Sponsor:** List the AFRL research topic sponsor's contact information

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3. **Academic Area/Field and Education Level**
Chemistry, engineering, biology (BS, MS or PhD level)

4. **Objectives:** Design and assembly of nucleic acid nanostructures with capabilities to sense different biomarkers of interest. Integration of mechanisms to control gene expression in response to biomarker levels (through release of microRNAs, etc.) in a biodegradable nanostructure platform to generate closed-loop sense/assess/respond capabilities.

5. **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. These biodegradable/autonomous theranostics (integrating therapy and diagnostics) agents provide a non-invasive, novel way to monitor and modulate health and performance at the molecular level.

6. **Research Classification/Restrictions:** Unclassified

7. **Eligible Research Institutions:** The Ohio State U., Wight State U., U. of Cincinnati, U. of Dayton, Ohio U., Miami U.

NOTE: Topics submitted to DAGSI must be approved for public release. The material was assigned a clearance of CLEARED on 23 Sep 2024, Pineiro Case Number: AFRL-2024-5222