RX21-11

DAGSI Research Topic (New)

1. **Research Title:**
   Process-Structure-Property Relationships of Additive Manufacturing PMCs
2. **Individual Sponsor:**

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

   Related Engineering Degree, Physics, Applied Math
   Additive Manufacturing, Fatigue
   (MS or PhD Level)

4. **Objectives:**
   Development of processing-structure-property relationships for additive manufacturing (3D printing) polymer matrix composites.
5. **Description:**
   Additive Manufacturing (AM) has been a game changing technology that has expanded the design space for several applications. Advanced manufacturing techniques are continuing to revolutionizing the fabrication of polymer matrix composite. Unfortunately, little is known about the basic microstructure and properties of these composites, and therefore many issues and challenges need to be resolved to adequately assess the performance. Ultimately, AFRL seeks to develop both the knowledge and methodologies required to understand the performance of composites made with this process. Development of processing-structure-property relationships would be foundational in understanding how they affect overall performance. This would include understand what material and processing parameters can be adjusted (e.g. resin type, UV light, intensity, deposition speed, compaction force, nozzle diameter) and how they influence the resulting microstructure of the composite (fiber volume fraction, porosity, fiber distribution). Proposal are requested to address the micromechanical structural variability as it relates to fracture behavior.

6. **Research Classification/Restrictions:**
   Unclassified research. Eligible for Public Release. Open to U.S. Citizens Only.
7. **Eligible Research Institutions:**
   All DAGSI Institutions