**Project Title:** Rapid Manufacturing of Vascularized Fiber-Reinforced Composites

**Advisor:** Polette Centellas (PhD student in AE), Prof. Nancy Sottos (MatSE)

**Project Description:**
Carbon-fiber (CF) reinforced composites are promising alternatives to metals for various structural applications, such as automotive and aircraft bodies. Microchannel(s) in high-strength composites enable additional functions (such as internal cooling) without compromising its structural performance. Previous manufacturing approaches of these vascular composites required a two-step, 18-hour process: 1) curing the composite with an embedded solid polymer fiber, then 2) thermally degrading the polymer fiber at elevated temperatures to leave behind an empty channel. Our proposed strategy combines the degradation of sacrificial poly(propylene carbonate) (PPC) fibers with a curing strategy called ‘frontal polymerization’ (FP) to rapidly manufacture vascular composites in a one-step process that takes minutes (Fig. 1a-c). As an undergraduate research assistant, your project will be to fabricate these vascular composites. The goal is to optimize the one-step process to form vascular composites with high structural integrity and identify the key parameters required to achieve this.
Student background and expected research activities:
We are seeking a driven, enthusiastic student who is interested in composite manufacturing. Hands-on experience in composites manufacturing is desired, but not mandatory. The student should be able to operate manufacturing equipment, follow procedures in a precise manner, and possess strong communication skills.

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Funding: Air Force Office of Scientific Research (AFOSR)