Zachary Swain
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302-300-0956

EDUCATION

University of Delaware, Newark DE

- PhD, Materials Science and Engineering — *June 2019 - Dec. 2024*
- Bachelor, Mechanical Engineering — *Sept. 2015 - June 2019*
  Aerospace Engineering Concentration, Mathematics Minor

EXPERIENCE

PhD Research — *June 2019 - Dec. 2024*

University of Delaware, Materials Science and Engineering, Newark DE

- Inventor of 3 intellectual properties under patenting process by UD
- Selected as inaugural Innovation Delaware Fellow with financial award from US SBA
- Led efforts for $5M grant to accelerate innovation in technology development for translational research
- Managed team of researchers for industry sponsored projects, proficient in report & proposal writing
- Lead researcher of NIH clinical trial for materials conducted with human participants at NFB Baltimore
- Investigated surface chemistry modification for interface mechanics, adhesion & friction dynamics for human factors, surface wear & fouling mechanisms for durability, additive manufacturing systems for composite materials, nonisothermal heat transfer & rheological modeling for property prediction

Managing Director — *May 2023 - Nov. 2024*

Falcon Additive, Wilmington DE

- Advanced additive manufacturing systems for composites and functional gradient material structures
- Managed team, company operation, licensing, product development, prototyping, and manufacturing
- Demonstrated ability in technology innovation & translation, commercialization strategy, lean deployment, team building, and managing industry partnerships

SKILLS

- Mechanical & thermal design, surface characterization, image analysis, class 100 cleanroom trained
- Programming (Python, Matlab, Fortran), simulation (FEA, CFD, FVM), CAD (Inventor, Solidworks)

Materials Characterization

• Mechanical testing	• Thermogravimetric analysis (TGA)	• Differential scanning calorimetry (DSC)
• Capillary & rotational rheology	• Dynamic mechanical analysis (DMA)	• Scanning electron microscopy (SEM)
• Spectroscopic ellipsometry	• Atomic force microscopy (AFM)	• Energy dispersive X-ray spec. (EDX)
• X-ray reflectometry (XRR)	• X-ray photoelectron spec. (XPS)	• Fourier-transform infrared spec. (FTIR)

PUBLICATIONS

- Swain, "Interface engineering and mechanics in haptics and additive manufacturing" — *In Review* — *Dec. 2024*
- Swain et al. "Self-assembled thin films as alternative surface textures..." — *RSC Materials Chemistry B* — *Sept. 2024*
- Nguyen et al. "One pot photomediated ... conductive hydrogels" — *ACS Polymers Au* — *Oct. 2023*
- "*Positive displacement pump material delivery system...*" — U.S. Patent App. 18/131,669 — *Aug. 2023*
- Naqi et al. "Dual material fused filament fabrication..." — *ACS Applied Polymer Materials* — *Feb. 2023*
- Phan et al. "Computational fluid dynamics simulation..." — *Additive Manufacturing* — *May 2020*
- Edwards et al. "Maximal 3D printing extrusion rates" — *IMA Journal of Applied Mathematics* — *Oct. 2019*
- Phan et al. "Rheological and heat transfer effects in fused filament fabrication" — *Journal of Rheology* — *Sept. 2018*
- Mackay et al. "The performance of the hot end in a plasticating 3D printer" — *Journal of Rheology* — *Mar. 2017*

CONFERENCE PRESENTATION

- *Extrudate instabilities in fused filament fabrication...* — Society of Rheology 92nd Annual Meeting — *Oct. 2021*

ACTIVITIES

- Adhesion Society - Alexandria, VA — *Jan. 2023 - Present*
- NSF Innovation Corps - National Science Foundation, Northeast Region — *June 2021 - Present*
- Intramural Basketball - University of Delaware, Newark DE — *Sept. 2015 - Present*

Coursework | Research Updates | Google Scholar | Linkedin