

Zachary Swain
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EDUCATION

University of Delaware, Newark DE

- PhD, Materials Science and Engineering
- Bachelor of Mechanical Engineering
- Aerospace Engineering Concentration, Mathematics Minor

June 2019 - Dec. 2024

Sept. 2015 - June 2019

EXPERIENCE

Graduate Researcher

June 2019 - Dec. 2024

University of Delaware, Materials Science and Engineering, Newark DE

- Inventor of 3 intellectual properties now under patenting process in US and EU
- 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
- Lead researcher of NIH clinical trial for haptic materials conducted with human participants
- Investigated surface chemistry for interface mechanics of haptics, design for touch perception, adhesion and friction dynamics for human factors, surface wear and fouling mechanisms for durability, advanced additive manufacturing systems for high performance, rheological modeling for property prediction
- Developed novel surface modification for time-tunable haptic information on everyday surfaces, novel advanced 3D printing systems for manufacturing of new composite materials with localized properties

Cofounder

Apr. 2023 - Nov. 2024

Delaware Touch Co., Wilmington DE

- Industrially scalable, tunable surface coatings to design human touch perception of products
- Managed team, IP strategy, licensing, product development, prototyping, and manufacturing
- Demonstrated ability in technology innovation & translation, commercialization strategy, lean deployment, team building & management, orienting strategic objectives, managing industry partnerships

SKILLS

- Demonstrated ability in technology innovation & translation, commercialization strategy, development / prototyping / production, lean deployment, orienting strategic objectives, team building & management
- Proficient in report & proposal writing, programming (Python, Matlab, Fortran), CAD (slicers, Inventor, Solidworks), simulation (FEA, CFD, FVM), machine design, image analysis, class 100 cleanroom trained

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, " Engineering mechanics of static and dynamic material interfaces" [In Preparation](#) 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..." [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 Sept. 2015 - Present

[Coursework](#)

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