Zachary Swain
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302-300-0956

EDUCATION

University of Delaware, Newark DE

- PhD, Materials Science and Engineering — *June 2019 - Dec. 2024*
  Coadvised by Dr. Charles Dhong and Dr. LaShanda Korley
- Bachelor, Mechanical Engineering — *Sept. 2015 - June 2019*
  Aerospace Engineering Concentration, Mathematics Minor

EXPERIENCE

Graduate Researcher — *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 haptic materials conducted with human participants
- Developed novel surface modification for time-tunable haptic feedback on everyday surfaces
- Investigated surface chemistry for control of haptic interface mechanics, materials design for touch perception, adhesion and friction dynamics for human factors, surface wear and fouling mechanisms for durability, nonisothermal heat transfer & thermorheological modeling for property prediction
- Funding from US Army Research Lab, NSF, NIST, DOE CPI EFRC, NIH R01, NIH R21

Cofounder — *Apr. 2023 - Nov. 2024*

Delaware Touch Co., Wilmington DE

- Tunable and scalable haptic surface coatings to design and engineer 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, and managing industry partnerships

SKILLS

- Psychophysical testing, 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*

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*

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