Zachary Swain
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## EDUCATION

**University of Delaware**, Newark DE

- PhD, Materials Science and Engineering — *June 2019 - Feb. 2025*
- Bachelor, Mechanical Engineering — *Sept. 2015 - June 2019*
  Aerospace Engineering Concentration, Mathematics Minor

## EXPERIENCE

**PhD Research** - Dr. LaShanda Korley & Dr. Charles Dhong — *June 2019 - Feb. 2025*
*University of Delaware - Materials Science and Engineering, Newark DE*

- Inventor of 3 intellectual properties under patenting process by UD in US & EU
- Selected as inaugural Innovation Delaware Fellow with financial award from US SBA
- 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
- Investigated surface chemistry modification for control of haptic interfaces, materials design for touch perception, adhesion and friction dynamics for human factors, surface wear and fouling mechanisms for interface properties, nonisothermal heat transfer & thermorheological modeling for property prediction
- Funding from US Army Research Laboratory, DOE CPI EFRC, NSF, NIH R01, NIH R21, Chemours

**Cofounder** — *Apr. 2023 - Nov. 2024*
*Delaware Touch Co., Wilmington DE*

- Tunable haptic surface coatings to modify friction and adhesion instabilities at human interfaces
- Managed team, IP strategy, licensing, product development, prototyping, and manufacturing
- Demonstrated ability in technological innovation, commercialization strategy, industry partnerships

## SKILLS

- Materials design for interfaces, surface characterization, technical writing, class 100 cleanroom trained
- Programming (Python, Matlab, Fortran), simulation (FEA, CFD, FVM), CAD (Solidworks, Inventor)

**Materials Characterization**

| | | |
|---|---|---|
| • Mechanical testing | • Atomic force microscopy (AFM) | • Scanning electron microscopy (SEM) |
| • Capillary & rotational rheology | • Dynamic mechanical analysis (DMA) | • Energy dispersive X-ray spec. (EDX) |
| • Spectroscopic ellipsometry | • Thermogravimetric analysis (TGA) | • Differential scanning calorimetry (DSC) |
| • 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" — *ProQuest* — *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

- Rheological instabilities in additive manufacturing — *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*
- SAMPE - Society for the Advancement of Material and Process Engineering, UD — *Sept. 2016 - Present*
- Intramural & Summer League Basketball - UD & Wilmington, DE — *Sept. 2015 - Present*

Coursework | Research | Google Scholar | Linkedin