Nicholas A. Alden

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EDUCATION:

Pennsylvania State University, University Park, Pennsylvania 2019-2023

Ph.D. Bioengineering
University Fellow 2019-2020
Diefenderfer Fellow 2022-2023

Virginia Tech University, Blacksburg, Virginia 2013-2018

M.S. Mechanical Engineering with Biomedical Engineering option, May 2018
B.S. Mechanical Engineering, minor in Biomedical Engineering, May 2017
Pi Tau Sigma National Mechanical Engineering Honor Society 2017; Sigma Alpha Lambda National Leadership and Honors Organization 2015-2017; Tau Sigma National Honor Society 2014-17; National Society of Collegiate Scholars 2014-17

West Virginia University, Morgantown, West Virginia, 2012-2013

Major: General Engineering
Phi Sigma Theta National Honor Society 2012-13

SKILLS:

- Experimental Design
- Nanoparticle Synthesis Chemistry
- RNAseq/DNAseq
- QPCR
- Galaxy Gene Seq.
- DLS-Z Potential
- Plate Reading
- X-Ray Diffraction
- Flow Cytometry
- In Vitro/In Vivo
- Tumor Spheroids
- SPIDER software
- RELION software
- Cryo-Electron Microscopy (TEM)
- Laboratory Benchwork
- ELISA
- Cell Culture
- Terminal/Linux
- Conference Talks & Poster Sessions
- LabView
- Six Sigma - Green Belt Certified
- Microsoft Office
- CAD/Autodesk Inventor
- MATLAB
- COMSOL
- C++
- CES materials software
- Simulink
- JMP
- GTA Experience

PUBLICATIONS:

Under Review

Nick Alden, Julien Arrizabalaga, Yiming Liu, Shantu Amin, Krishne Gowda, Shun Yao, Marco Archetti, Adam Glick, Daniel Hayes (2022). Delivery of Therapeutic miR-148b Mimics via Poly(Beta Amino Ester) Polyplexes for the Treatment of Non-Small Cell Lung Cancer

Published

Nick A. Alden, A.Cameron Varano, William J. Dearnaley, Maria J. Solares, William Y. Luqiu, Yanping Liang, Zhi Sheng, Sarah M. McDonald, John Damiano, Jennifer McConnell, Madeline J. Dukes, and Deborah F. Kelly (2019). Cryo-EM-on-a-Chip: Custom-designed Substrates for the 3D Analysis of Macromolecules. *Small*. 15(21), 1900918.

William J. Dearnaley, Beatrice Schleupner, A.Cameron Varano, Nick A. Alden, Floricel Gonzalez, Michael Casasanta, Birgit E. Scharf, Madeline J. Dukes and Deborah F. Kelly (2019). Liquid-Cell Electron Tomography of Biological Systems. *Nano Letters (in press)* DOI: 10.1021/acs.nanolett.9b01309.

A.Cameron Varano, Nick A. Alden, William J. Dearnaley, Michael Casasanta, John Damiano, Jennifer McConnell, Madeline J. Dukes, and Deborah F. Kelly (2019). Customizable Cryo-EM Chips Improve 3D Analysis of Macromolecules. *Microscopy & Microanalysis*. (25) S2, 1310-1311.

Yanping Liang, William J. Dearnaley, Nick A. Alden, Maria J. Solares, Kevin J. Pridham, A.Cameron Varano, Zhi Sheng, Elizabeth All, and Deborah F. Kelly (2019). Correcting Errors in the BRCA1 Warning System. *DNA Repair*. 73, 120 – 128.

Yanping Liang, William Dearnaley, A. Cameron Varano, Carly E. Winton, Brian L. Gilmore, Nick Alden, Zhi Sheng, and Deborah F. Kelly (2017). Structural Analysis of BRCA1 Reveals Modification Hot Spot. *Science Advances.* 3:e1701386.

MASTERS THESIS:

Nick Alden, Cameron Verano, William Dearnaley, Yanping Liang, Deborah Kelly (2018). Tunable Microchips for Imaging Protein Structures formed in Breast Cancer Cells. *Virginia Polytechnic and State University Libraries.*

SELECT, RELAVENT ACADEMIC PROJECTS:

Penn State University Current Research – Development of inorganic-based magnetic nanoparticles utilizing thermally labile Diels Alder linker chemistry for the controlled delivery of gene regulating siRNA/miRNA therapeutic payloads *in vitro* (2D and 3D models) and *in vivo* (mouse model). The thermally labile linkers undergo the retro-Diels Alder reaction, cleaving due to the heat generated within the magnetic nanoparticles when activated in a radio frequency-driven alternating magnetic field (AMF-RF) at sub-hyperthermia temperatures, allowing for therapeutic payloads to be released in deep tissue targets where light activated nanoparticle systems may be unfavorable.

Penn State University Biology of RNA Course – Developed RNAsequencing data for a project aimed to determine the role of various micro-RNA (miRNA) interactions on gene regulation in Adenocarcinoma Lung Cancer mouse models for their potential therapeutic use in applications using nanoparticle-based controlled release mechanisms.

Virginia Tech Graduate Applied Linear Systems Course – Developed Matlab models of Linear Systems for the design and implementation of an open-loop LTI (Linear Time-Invariant) system, a full state feedback plus integral control design, a closed-loop LTI system, and an observer and state estimator system in response to initial conditions. The model represented a gantry crane in response to non-equilibrium initial conditions in which the goal was to drive the system to the origin (also known as the "Regulator Problem").

Virginia Tech Senior Design – Implant Infection Prevention, utilizing STEP (Spinneret based Tunable Engineering Parameters) – STEP is a technique to develop polymeric nanofibers that can be deposited onto surfaces to create a precisely textured finish with anti-microbial protective properties. I worked in a team of five members to implement five subsystems (Pressure Control, Needle Cutting, Fiber Centering, Adjustable Substrate Holder, and an Enclosure) to enhance the nanofiber deposition process efficiency, and consistency. I lead the development of an Enclosure using Autodesk Inventor and appropriate materials for laser cutting and fabrication while maintaining close communication and collaborative aid in the progression of the other major subsystems.

Virginia Tech Carilion Research Institute – Colorimetric Detection of BRCA1 protein complexes through ELISA (enzyme-linked immunosorbent assay). I worked on developing a novel, specifically aimed protocol for the colorimetric concentration quantification of BRCA1 complexes through the development of a Capture "Sandwich" ELISA utilizing antibodies raised against BRCA1 complexes as well as functionalized Ni-NTA (Nickel-Nitrilotriacetic Acid).

Virginia Tech 4th Year CAD of Fluid-Thermal Systems – Developed models for the design and testing of Thermodynamic Systems in the EES software package as well as using ANSYS and Fluent software for CFD (Computational Fluid Dynamics) models.

Virginia Tech 3rd Year Mechanical Design Course – Completed a two-man-team project where we developed Autodesk Inventor models of a vehicle rear spoiler for FEA analysis and structural testing.

WORK EXPERIENCE:

Kollmorgen, Radford, VA July 2018 – to present
Application Engineer

- Sizing and selection of customer applications utilizing engineering specifications of Kollmorgen products to fulfill customer motion-task needs
- Technical support for field sales engineers and partner distributors

Virginia Tech Carilion Research Institute, Roanoke, VA May 2016 – July 2018
Research Assistant (Full-time salaried): February 2018 – July 2018

- Publications in preparation outlining work completed on graduate thesis

Graduate Research Assistant: May 2017 – February 2018

- Completed thesis on the Cryo-SiN enhanced protein capture and 3D reconstruction techniques using BRCA1 from MDA-MB-361 metastatic breast cancer cells

Summer Intern transitioned into Undergraduate Research Assistant: May 2016 – May 2017

- Successfully developed a novel ELISA protocol for the Colorimetric Detection of BRCA1

Altec Industries, Daleville, VA May 2015 – Jan 2016
Co-Op/Intern in Quality Engineering: (full-time)

- Produced enhanced plant operating efficiency as part of multi-functional teams
- Traced root causes for quality defects and provided corrective action through engineering
- Successfully ran a defect reduction kaizan that reduced defects in the production line 15%
- Participated in 4 additional RCI projects led by the other engineering departments to improve function in the plant

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INTERESTS:
Innovation & entrepreneurship; advancement of technology; nanomedicine; biomedical devices; genetics and epigenetics; gene regulation; machine learning; mathematical modeling and diagnostics systems; music and songwriting; writing; architectural design; psychology; automobiles; outdoor activities; exercise/nutrition; weight-training; cycling; running; football; basketball; soccer;