



THE UNIVERSITY OF ARIZONA

Wyant College
of Optical Sciences

INDUSTRIAL AFFILIATES WORKSHOP

STUDENT SPEAKER PROFILE



TYLER PETERSON, PH.D. STUDENT

Wyant College of Optical Sciences

Advisor: Rongguang Liang

Tuesday, February 15, 2022 | 2:04 p.m.

Title: "Monolithic Freeform Prism for Handheld Multiphoton Probe"

Abstract: Multiphoton autofluorescence microscopy provides deep mucosal imaging at subcellular resolution, making it highly promising as an optical biopsy method for oral cancer detection and diagnosis. A small device form factor is required to comfortably navigate the oral cavity, but this conflicts with the need for a large numerical aperture (NA) to efficiently excite endogenous fluorophores. To mitigate this tradeoff, we present the design of a monolithic freeform prism objective with a NA of 0.50 and field of view of 800 μ m. The prism will be manufactured in-house using single point diamond turning. We also present a design concept for an auxiliary prism that leverages multiple surfaces of the objective prism to enable large area scanning, extending the clinical usefulness of the proposed handheld probe.

Bio: Tyler Peterson is a second-year Ph.D. student in Dr. Rongguang Liang's lab at the University of Arizona, where he works on the design of clinical imaging devices for early cancer detection. He is currently investigating design strategies for freeform optics with an eye for manufacturability, as well as novel microscopy systems that leverage emerging illumination technologies. Prior to joining UA, Tyler received his M.S. in Applied Physics from the University of Oregon and worked in industry as an optical engineer for five years designing and testing fluorescence microscopes. In his free time, he enjoys playing jazz piano, hiking, drawing, and reading.



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