

Thesis Portfolio

Fabrication and Read-out of Integrated Photonic High Frequency Acoustic Wave Detectors

(Technical Report)

Organizational Interplay in the Development of Silicon Photonics (STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Sciences
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science in Engineering

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Table of Contents

SocioTechnical Synthesis	3
Thesis Prospectus	Error! Bookmark not defined.
Prospectus Body.....	5
References.....	6
Technical Report.....	7
Technical Report as Required by Department	8
STS Thesis	9
Thesis Body	10
References.....	11

SocioTechnical Synthesis

Photoacoustic microscopy is a burgeoning field in medical imaging, and current state-of-the-art ultrasonic detectors limit its application with large sensors that do not easily integrate into arrays. We seek to replace the current state-of-the-art ultrasonic detectors with a new platform based in silicon photonics. These sensors will be more than an order of magnitude smaller than current state-of-the-art sensors with the potential for large arrays using wavelength multiplexing. The field of silicon photonics offers economic advantages over other platforms for photonics in cheap and available mass-production, but the current technology for silicon photonics is limited. The organizational pressures for silicon photonics should be considered in determining the necessity of silicon photonics research as well as its path for the future. The concept of path dependence can bring an understanding of silicon photonics research: the previous investments and decisions by organizations have had a large influence on current actions in silicon photonics research and development. A combination of historical and contemporary case studies as well as interviews with silicon photonics experts will be used to understand the past and current state of the field. This data will elucidate the scientific and commercial viability of silicon photonics as well as the path forward for future research and development. Our technology is tied to the silicon photonics platform currently being developed, and consequently its success is directly coupled with the collaborative partnership between industry, academia, and government towards developing silicon photonics.